

The First Global Financial Crisis of the 21st Century

Part I: August 2007–
May 2008

Edited by Andrew Felton and Carmen Reinhart



A VoxEU.org Report

The First Global Financial Crisis of the 21st Century

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Preface

This book is a selection of VoxEU.org columns that deal with the subprime crisis. VoxEU.org is a portal for research-based policy analysis and commentary written by leading economists. It was launched in June 2007 with the aim of enriching the economic policy debate by making it easier for serious researchers to contribute and to make their contributions more accessible to the public.

The subprime crisis, which boiled over in August 2007, was the perfect showcase for Vox's unique approach. Mainstream media's explanations of it as a liquidity crisis did not seem to fit the facts. How could a few deadbeat homeowners in the United States bring down a German Landesbank, force a restructuring on a major French bank, and compel the Fed and the European Central Bank (ECB) to undertake emergency injections of cash? The story was surely deeper than a standard-issue credit problem.

Starting on 13 August 2007, Vox posted a slew of columns by economists who really knew what they were talking about and were willing to explain the crisis in terms that any trained economist could understand. Mainstream media's limits (800 words written for the average newspaper reader) just did not work for an event of this complexity. Vox provided commentators with the space to explain the situation using standard economic terminology. It raised the level of the public debate and this attracted researchers who had also been at the cutting edge of policy-making, such as: Willem Buiter (professor at LSE and former member of the Bank of England's rate-setting Monetary Policy Committee), Steve Cecchetti (professor at Brandeis University and former Executive Vice President and Director of Research at the New York Fed), Charles Wyplosz (professor at the Graduate Institute, Geneva and adviser to central banks), Marco Onado (professor at Bocconi and former Commissioner of the Italian public authority responsible for regulating the Italian securities market, CONSOB), Tito Boeri (professor at Bocconi and editor of *LaVoce*) and Luigi Spaventa (professor in Rome and former Chairman of CONSOB).

On behalf of CEPR and the Vox editorial board, I would like to thank Carmen Reinhart for agreeing to edit this compilation of columns. Together with her colleague at the University of Maryland's School of Public Policy, Andrew Felton, the result is what follows, a primer on what is probably the worst financial crisis of our generation.

Richard Baldwin, VoxEU.org, Editor-in-Chief and CEPR Policy Director
June 2008

Introduction

Global financial markets are showing strains on a scale and scope not witnessed in the past three-quarters of a century. What started with elevated losses on US subprime mortgages has spread beyond the borders of the United States and the confines of the mortgage market. Risk spreads have ballooned, liquidity in some market segments has dried up and large complex financial institutions have admitted significant losses. Bank runs are no longer the subject exclusively of history.

These events have challenged policy-makers, and the responses have varied across regions. The ECB has injected reserves in unprecedented volumes. The Bank of England participated in the bailout and, ultimately, the nationalization of a depository, Northern Rock. The US Federal Reserve has introduced a variety of new facilities and extended its support beyond the depository sector.

These events have also challenged economists to explain why the crisis developed, how it is unfolding, and what can be done. This volume compiles contributions by leading economists in VoxEU over the past year that attempt to answer these questions. We have grouped these contributions into three sections corresponding to those three critical questions.

Why did the crisis happen?

The first set of articles contains reflections on the reasons for the crisis. Although it is tempting to suggest that the crisis was inevitable with hindsight, several articles emphasize the inherent uncertainty of economic analysis. Dell'Ariccia, Igan and Laeven discuss the role of uncertainty in the subprime lending boom. Persaud and Danielsson both caution against the overreliance on standardized quantitative risk models. Finally, Wyplosz counsels prudence when analysing the crisis and its causes in the face of high uncertainty.

Several articles search for the roots of the crisis in public policy, either monetary or regulatory. Cecchetti has a series of 'Frequently Asked Questions' about the extraordinary monetary policy actions taken to alleviate the crisis. He argues that crises are endemic to modern economies and should not necessarily be blamed on monetary policy. A well-functioning financial system needs both deposit insurance and a central bank with regulatory authority, he says. Boeri and Guiso disagree, blaming the crisis on low US interest rates. Ioannidou et al. avoid directly blaming the Federal Reserve for the crisis but present empirical evidence that low

interest rates, like those present in the United States in 2003 and 2004, encourage ex-ante risk-taking.

Other articles focus on the regulatory system. Tabellini blames some of the problem on the fragmented nature of the US regulatory system. Spaventa focuses on the growth of off-balance sheet banking activity and argued that regulators both missed the explosive growth of financing mechanisms like structured investment vehicles (SIVs) and failed to see the hidden risks to the banking system that these unconventional instruments created.

Several authors reach beyond the recent past to understand the present. Bordo, starting from 1921, finds that turning points in the credit cycle often correspond to turning points in the business cycle as well. Reinhart reviews five major financial crises in industrial economies and concludes that the current economic problems have a great deal of precedent.

How is the crisis unfolding?

The next section consists of articles discussing the events as they unfolded. As the crisis opened in late summer 2007, economists disagreed on its likely magnitude. It initially appeared to be a simple liquidity problem. The Federal Reserve introduced a number of novel policy responses in its role as lender of last resort role, detailed in a continuation of Cecchetti's FAQ series. These policies included the largest single cut in the federal funds target rate since the early 1980s, currency swaps with foreign central banks, and three new lending mechanisms, the term auction facility, the term securities lending facility, and the primary dealer credit facility. Monacelli thinks that the liquidity problems are 'extensive but benign'. Calomiris contends that 'there is little reason to believe that a substantial decline in credit supply under the current circumstances will magnify the shocks and turn them into a recession'. Buiter judges the Federal Reserve's first rate cut in September 2007 unnecessary, because of the fiscal policy response under way.

Buiter also cautions everyone to remember the difference between inside assets, which are a zero-sum game that just transfer money between parties, and outside assets, which are real assets that lack an offsetting liability. Vives suggests that the problems in modern markets such as asset-backed commercial paper, auction-rate securities, etc., directly parallel and require the same response as an old-fashioned banking crisis, namely the central bank should lend freely against good collateral at penalty rates (as Bagehot's classic wisdom suggests).

However, Ubide presciently spells out a variety of reasons why what appeared at first to be a simple liquidity problem masked far deeper credit pathologies. Snower tries to anticipate some of the possible international spillover effects from the US problems. In another article, Snower outlines four mega-dangers to the financial system and suggests that our surprise at continued crises is more surprising than the crises themselves.

The section ends with another article by Cecchetti that summarizes the Federal Reserve's reactions to date. Wyplosz admires the Fed's innovation and speed, contrasting it to the more cautious ECB.

What can be done?

VoxEU.org has published several articles with policy suggestions to prevent this kind of crisis from happening again. One major theme was enhancing information dissemination. In August, Onado focused on three aspects that later commentators would return to: credit ratings, evaluations of asset marketability and transparency in the retail market for financial assets. Giovannini and Spaventa urge greater dissemination of information and rethinking of the Basel II accord on bank capital requirements.

Buiter contributes a series of articles on the policy lessons from the United Kingdom's Northern Rock debacle. He blames both policies and institutional arrangements, including an ineffective deposit-insurance scheme, poor regulatory coordination and division of responsibilities, and weaknesses of the supervisory standards embodied in Basel II.

Portes writes on regulatory reform, covering ratings agencies, sovereign wealth funds and financial institutions. De la Dehesa urges more regulation of mortgage brokers, greater transparency and methods to overcome banks' principal-agent problems. Persaud says that regulators need to accept that the commoditization of lending means that instability is built into the financial system and regulators need to proactively pursue counter-cyclical policies.

The future of monetary policy and central banking is also a recurring theme. De Grauwe contends that inflation targeting restricts banks' ability to restrain asset bubbles, while Assenmacher-Wesche and Gerlach warn against trying to use central-bank policy to stabilize asset prices. Buiter and Sibert advocate the expanded use of liquidity policies rather than monetary easing. They think that central banks should act as the market-maker of last resort. Spaventa proposes that the government should purchase illiquid securities, likening his proposal to the Brady Plan that unfroze the Latin American debt markets in 1989.

Section 1

Why Did the Crisis Happen?

The relationship between the recent boom and the current delinquencies in subprime mortgages

Giovanni Dell'Ariccia, Deniz Igan and Luc Laeven
IMF; IMF; IMF and CEPR

4 February 2008

Recent US mortgage market troubles unsteadied the global economy. This article summarizes research analysing millions of loan applications to investigate the roots of the crisis. A credit boom may be to blame.

Recent events in the market for mortgage-backed securities have placed the US subprime mortgage industry in the spotlight. Over the last decade, this market has expanded dramatically, evolving from a small niche segment into a major portion of the overall US mortgage market. Can the recent market turmoil – triggered by the sharp increase in delinquency rates – be related to this rapid expansion? In other words, is the recent experience, in part, the result of a credit boom gone bad? While many would say yes to these questions, rigorous empirical evidence on the matter has thus far been lacking.

Credit booms

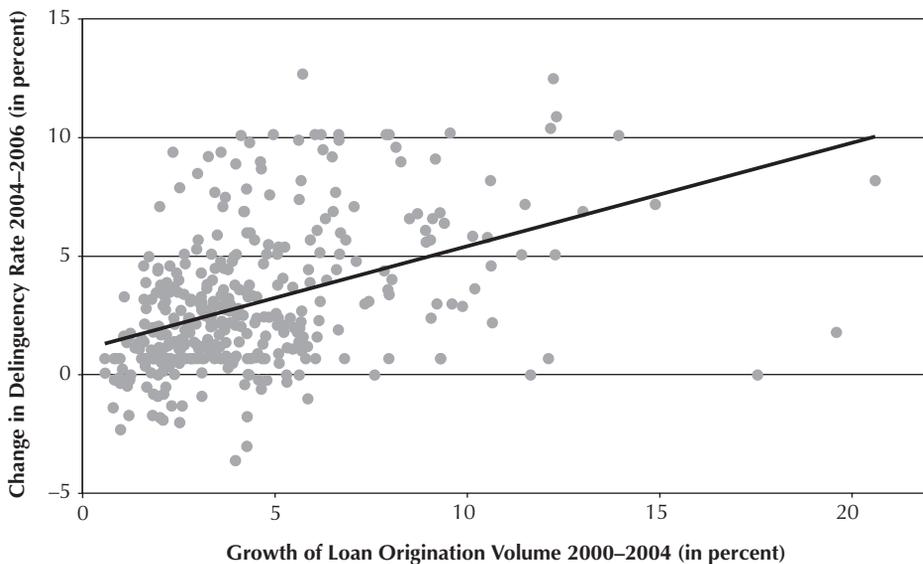
There appears to be widespread agreement that periods of rapid credit growth tend to be accompanied by loosening lending standards. For instance, in a speech delivered before the Independent Community Bankers of America on 7 March 2001, the then Federal Reserve chairman, Alan Greenspan, pointed to ‘an unfortunate tendency’ among bankers to lend aggressively at the peak of a cycle and argued that most bad loans were made through this aggressive type of lending.

Indeed, most major banking crises in the past 25 years have occurred in the wake of periods of extremely fast credit growth. Yet not all credit booms are followed by banking crises. Indeed, most studies find that, while the probability of a banking crisis increases significantly (by 50–75%) during booms, historically only about 20% of boom episodes have ended in a crisis. For example, out of 135 credit booms identified in Barajas et al. (2007) only 23 preceded systemic banking crises (about 17%), with that proportion rising to 31 (about 23%) if non-systemic episodes of financial distress are included. In contrast, about half of the banking crises in their sample were preceded by lending booms. Not surprisingly, larger and longer-lasting booms, and those coinciding with higher inflation and – to a lesser extent – lower growth, are more likely to end in a crisis. Booms associated with fast-rising asset prices and real-estate prices are also more likely to end in crises.

The mortgage market

Reminiscent of this pattern linking credit booms with banking crises, current mortgage delinquencies in the US subprime mortgage market appear indeed to be related to past credit growth (Figure 1). In a new working paper, we analyse data from over 50 million individual loan applications and find that delinquency rates rose more sharply in areas that experienced larger increases in the number and volume of originated loans (Dell’Ariccia et al., 2008). This relationship is linked to a decrease in lending standards, as measured by a significant increase in loan-to-income ratios and a decline in denial rates, not explained by improvement in the underlying economic fundamentals.

Figure 1 A credit boom gone bad?



In turn, the deterioration in lending standards can be linked to five main factors. Standards tended to decline more where the credit boom was larger. This is consistent with cross-country evidence on aggregate credit booms.

Lower standards were associated with a fast rate of house price appreciation, consistent with the notion that lenders were to some extent gambling on a continuing housing boom, relying on the fact that borrowers in default could always liquidate the collateral and repay the loan.

Changes in market structure mattered: lending standards declined more in regions where large (and aggressive) previously absent institutions entered the market.

The increasing recourse by banks to loan sales and asset securitization appears to have affected lender behaviour, with lending standards experiencing greater declines in areas where lenders sold a larger proportion of originated loans.

Easy monetary conditions seem to have played a role, with the cycle in lending standards mimicking that of the Federal Fund rate. In the subprime mortgage market most of these effects appear to be stronger and more significant than in the prime mortgage market, where loan denial decisions seem to be more closely related to economic fundamentals.

These findings are consistent with the notion that rapid credit growth episodes, due to the cyclical nature of lending standards, might create vulnerabilities in the financial system. The subprime experience demonstrates that even highly-developed financial markets are not immune to problems associated with credit booms.

Possible solutions

What can be done to curb bad credit booms? Historically, the effectiveness of macroeconomic policies in reducing credit growth has varied (see, for example, Enoch and Ötoker-Robe, 2007). While monetary tightening can reduce both the demand and supply of bank loans, its effectiveness is often limited by capital-account openness. This is especially the case in small open economies and in countries with more advanced financial sectors, where banks have easy access to foreign credit, including from parent institutions. Monetary tightening may also lead to significant substitution between domestic and foreign-denominated credit, especially in countries with (perceived) rigid exchange-rate regimes. Fiscal tightening may also help reduce the expansionary pressures associated with credit booms, though this is often not politically feasible.

While prudential and supervision policies alone may prove not very effective in curbing credit growth, they may be very effective in reducing the risks associated with a boom. Such policies include prudential measures to ensure that banks and supervisors are equipped to deal with enhanced credit risk (such as higher capital and provisioning requirements, more intensive surveillance of potential problem banks and appropriate disclosure requirements of banks' risk management policies). Prudential measures may also target specific sources of risks (such as limits on sectoral loan concentration, tighter eligibility and collateral requirements for certain categories of loans, limits on foreign-exchange exposure and maturity mismatch regulations). Other measures may aim at reducing existing distortions and limiting the incentives for excessive borrowing and lending (such as the elimination of implicit guarantees or fiscal incentives for particular types of loans, and public risk awareness campaigns).

In response to aggressive lending practices by mortgage lenders, several states in the United States have enacted anti-predatory lending laws. By the end of 2004, at least 23 states had enacted predatory lending laws that regulated the provision of high-risk mortgages. However, research shows that these laws have not been effective in limiting the growth of such mortgages, at least in the United States (see, for example, Ho and Pennington-Cross, 2007). At the end of 2006, US federal banking agencies issued two guidelines out of concern that financial institutions had become overexposed to the real-estate sector while lending standards and risk management practices had been deteriorating, but these guidelines were too little, too late.

International concerns

Other countries thus far seem to have avoided a crisis in their nonprime mortgage markets. The UK, for example, where nonprime mortgages also constitute an

increasingly large share of the overall mortgage market, has thus far avoided a surge in delinquencies of such mortgages (though in September 2007, the US subprime crisis indirectly did lead to liquidity problems and eventually a bank run on deposits at Northern Rock, the United Kingdom's fifth-largest mortgage lender at the time). Regulatory action on the part of the UK Financial Services Authority, resulting in the 2004 Regulation on Mortgages, which made mortgage lending more prescriptive and transparent in the UK, may have played a role. Of course, only time will tell how successful these actions have been. We would not be surprised to learn that lending standards have also deteriorated in mortgage markets outside the United States.

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Note: This article refers to CEPR Discussion Paper DP6683.

Why bank risk models failed

Avinash Persaud
Intelligence Capital

4 April 2008

Financial supervision arguably failed to prevent today's turmoil because it relied upon the very price-sensitive risk models that produced the crisis. This article calls for an ambitious departure from trends in modern financial regulation to correct the problem.

Greenspan and others have questioned why risk models, which are at the centre of financial supervision, failed to avoid or mitigate today's financial turmoil. There are two answers to this, one technical and the other philosophical. Neither is complex, but many regulators and central bankers chose to ignore them both.

The technical explanation is that the market-sensitive risk models used by thousands of market participants work on the assumption that each user is the only person using them. This was not a bad approximation in 1952, when the intellectual underpinnings of these models were being developed at the Rand Corporation by Harry Markovitz and George Dantzig. This was a time of capital controls between countries, the segmentation of domestic financial markets and – to get the historical frame right – it was the time of the Morris Minor with its top speed of 59mph.

In today's flat world, market participants from Argentina to New Zealand have the same data on the risk, returns and correlation of financial instruments, and use standard optimization models, which throw up the same portfolios to be favoured and those not to be. Market participants do not stare helplessly at these results. They move into the favoured markets and out of the unfavoured. Enormous cross-border capital flows are unleashed. But under the weight of the herd, favoured instruments cannot remain undervalued, uncorrelated and low-risk. They are transformed into the precise opposite.

When a market participant's risk model detects a rise in risk in his or her portfolio, perhaps because of some random rise in volatility, and he or she tries to reduce his exposure, many others are trying to do the same thing at the same time with the same assets. A vicious cycle ensues as vertical price falls, prompting further selling. Liquidity vanishes down a black hole. The degree to which this occurs has less to do with the precise financial instruments and more with the depth of diversity of investors' behaviour. Paradoxically, the observation of areas of safety in risk models creates risks, and the observation of risk creates safety. Quantum physicists will note a parallel with Heisenberg's uncertainty principle.

Policy-makers cannot claim to be surprised by all of this. The observation that market-sensitive risk models, increasingly integrated into financial supervision in a prescriptive manner, were going to send the herd off the cliff edge was made soon after the last round of crises.¹ Many policy officials in charge today responded then that these warnings were too extreme to be considered realistic.

The reliance on risk models to protect us from crisis was always foolhardy. In terms of solutions, there is only space to observe that if we rely on market prices in our risk models and in value accounting, we must do so on the understanding that in rowdy times central banks will have to become buyers of last resort of distressed assets to avoid systemic collapse. This is the approach upon which we have stumbled. Central bankers now consider mortgage-backed securities as collateral for their loans to banks. But the asymmetry of being a buyer of last resort without also being a seller of last resort during the unsustainable boom will only condemn us to cycles of instability.

The alternative is to try to avoid booms and crashes through regulatory and fiscal mechanisms which counter the incentives that induce traders and investors to place highly leveraged bets on what the markets currently believe is a 'sure thing'. This sounds fraught with regulatory risks, and policy-makers are not as ambitious as they once were. We no longer walk on the moon. Of course, President Kennedy's 1961 ambition to get to the moon within the decade was partly driven by a fear of the Soviets getting there first. Regulatory ambition should be set now, while the fear of the current crisis is fresh and not when the crisis is over and the seat belts are working again.

¹ Avinash Persaud (2000), 'Sending the Herd off the Cliff Edge: the Disturbing Interaction between Herding and Market-sensitive Risk Management Models', Jacques de Larosiere Prize Essay, Institute of International Finance, Washington, DC.

Blame the models

Jon Danielsson
London School of Economics

8 May 2008

In response to financial turmoil, supervisors are demanding more risk calculations. But model-driven mispricing produced the crisis, and risk models do not perform during crisis conditions. The belief that a really complicated statistical model must be right is merely foolish sophistication.

A well-known US economist, drafted during the second world war to work in the US Army meteorological service in England, got a phone call from a general in May 1944 asking for the weather forecast for Normandy in early June. The economist replied that it was impossible to forecast weather that far into the future. The general wholeheartedly agreed but nevertheless needed the number now for planning purposes.

Similar logic lies at the heart of the current crisis.

Statistical modelling increasingly drives decision-making in the financial system, while at the same time significant questions remain about model reliability and whether market participants trust these models. If we ask practitioners, regulators or academics what they think of the quality of the statistical models underpinning pricing and risk analysis, their response is frequently negative. At the same time, many of these same individuals have no qualms about an ever-increasing use of models, not only for internal risk control but especially for the assessment of systemic risk and therefore the regulation of financial institutions.¹ To have numbers seems to be more important than whether the numbers are reliable. This is a paradox. How can we simultaneously mistrust models and advocate their use?

What's in a rating?

Understanding this paradox helps understand both how the crisis came about and the frequently inappropriate responses to the crisis. At the heart of the crisis is the quality of ratings on SIVs. These ratings are generated by highly sophisticated statistical models.

Subprime mortgages have generated most headlines. That is of course simplistic. A single asset class worth only \$400 billion should not be able to cause such turmoil.

¹ For example, see Nassim Taleb (2007), *Fooled by Randomness: the Hidden Role of Chance in Life and the Markets*, Harmondsworth: Penguin Books.

And indeed, the problem lies elsewhere, with how financial institutions packaged subprime loans into SIVs and conduits and the low quality of their ratings.

The main problem with the ratings of SIVs was the incorrect risk assessment provided by rating agencies, who underestimated the default correlation in mortgages by assuming that mortgage defaults are fairly independent events. Of course, at the height of the business cycle that may be true, but even a cursory glance at history reveals that mortgage defaults become highly correlated in downturns. Unfortunately, the data samples used to rate SIVs often were not long enough to include a recession.

Ultimately this implies that the quality of SIV ratings left something to be desired. However, the rating agencies have an 80-year history of evaluating corporate obligations, which does give us a benchmark to assess the ratings quality. Unfortunately, the quality of SIV ratings differs from the quality of ratings of regular corporations. A AAA for a SIV is not the same as a AAA for Microsoft.

And the market was not fooled. After all, why would a AAA-rated SIV earn 200 basis points above a AAA-rated corporate bond? One cannot escape the feeling that many players understood what was going on but happily went along. The pension fund manager buying such SIVs may have been incompetent, but he or she was more likely simply bypassing restrictions on buying high-risk assets.

Foolish sophistication

Underpinning this whole process is a view that sophistication implies quality: a really complicated statistical model must be right. That might be true if the laws of physics were akin to the statistical laws of finance. However finance is not physics, it is more complex (Danielsson, 2002).

In physics the phenomena being measured do not generally change with measurement. In finance that is not true. Financial modelling changes the statistical laws governing the financial system in real time. The reason is that market participants react to measurements and therefore change the underlying statistical processes. The modellers are always playing catch-up with each other. This becomes especially pronounced when the financial system gets into a crisis.

This is a phenomena we call endogenous risk, which emphasizes the importance of interactions between institutions in determining market outcomes. Day to day, when everything is calm, we can ignore endogenous risk. In crisis, we cannot. And that is when the models fail.

This does not mean that models are without merits. On the contrary, they have a valuable use in the internal risk management processes of financial institutions, where the focus is on relatively frequent small events. The reliability of models designed for such purposes is readily assessed by a technique called backtesting, which is fundamental to the risk management process and is a key component in the Basel Accords.

Most models used to assess the probability of small frequent events can also be used to forecast the probability of large infrequent events. However, such extrapolation is inappropriate. Not only are the models calibrated and tested with particular events in mind, but it is impossible to tailor model quality to large infrequent events or to assess the quality of such forecasts.

Taken to the extreme, I have seen banks required to calculate the risk of annual losses once every thousand years, the so-called 99.9% annual losses. However, the fact that we can get such numbers does not mean the numbers mean anything. The problem is that we cannot backtest at such extreme frequencies. Similar arguments apply to many other calculations, such as expected shortfall or tail value-at-risk. Fundamental to the scientific process is verification, in our case backtesting. Neither the 99.9% models nor most tail value-at-risk models can be backtested, and therefore cannot be considered scientific.

Demanding numbers

We do, however, see increasing demands from supervisors for exactly the calculation of such numbers as a response to the crisis. Of course the underlying motivation is the worthwhile goal of trying to quantify financial stability and systemic risk. However, exploiting the banks' internal models for this purpose is not the right way to do it. The internal models were not designed with this in mind and to do this calculation is a drain on the banks' risk management resources. It is the lazy way out. If we do not understand how the system works, generating numbers may give us comfort. But the numbers do not imply understanding.

Indeed, the current crisis took everybody by surprise in spite of all the sophisticated models, all the stress testing and all the numbers. I think the primary lesson from the crisis is that the financial institutions that had a good handle on liquidity risk management came out best. It was management and internal processes that mattered – not model quality. Indeed, the problem created by the conduits cannot be solved by models, but the problem could have been prevented by better management and especially better regulations.

With these facts increasingly understood, it is incomprehensible to me why supervisors are increasingly advocating the use of models in assessing the risk of individual institutions and financial stability. If model-driven mispricing enabled the crisis to happen, what makes us believe that future models will be any better?

Therefore one of the most important lessons from the crisis has been the exposure of the unreliability of models and the importance of management. The view frequently expressed by supervisors that the solution to a problem like the subprime crisis is Basel II is not really true. The reason is that Basel II is based on modelling. What is missing is for the supervisors and the central banks to understand the products being traded in the markets and have an idea of the magnitude, potential for systemic risk and interactions between institutions and endogenous risk, coupled with a willingness to act when necessary. In this crisis the key problem lies with bank supervision and central banking, as well as with the banks themselves.

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The subprime crisis: observations on the emerging debate

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A basic principle of high uncertainty is to be careful. This principle also applies to analyses of the situation, even if decisiveness in the face of turmoil is at a premium. Better wait than make things worse. Here are a few observations to sort through the emerging debate.

As financial anxiety keeps mounting worldwide, comments flourish and joyfully contradict each other. Central banks are bailing out dangerous gamblers, says one. They are skilfully preventing a 1929-style crash, says another one. Things are being gradually normalized, some assert. This is just the beginning of a vicious circle of unforeseen meltdown, just wait, warn others.

One thing all agree about is that uncertainty, which market participants with short memories – many of whom were teenagers or unborn the last big time around – thought was a thing of the past, has made a striking comeback. Uncertainty did not just hit markets all over the world, it is affecting our understanding as well, hence the wide disparity of opinions. A basic principle of high uncertainty is to be careful. This principle also applies to analyses of the situation, even if decisiveness in the face of turmoil is at a premium. Better wait than make things worse. Here are a few observations to sort through the emerging debate.

The origin of the problem is pretty well understood and adequately described in Stephen Cecchetti's 15 August 2007 Vox column 'Federal Reserve policy actions in August 2007: frequently asked questions'. As the US housing bubble is working its way out, mortgaged loans go sour. Since the institutions that granted these loans have promptly sold them on – this is the securitization process – to other institutions, which sold them on to others, and so on again and again, those who suffer losses are the ultimate holders. There are so many of them, all over the world, that no one knows where the losses are being borne. It could even be you, through your pension fund or some innocuous-looking investment.

The second observation that all agree about is that the total size of the now infamous subprime loans, even augmented by normal mortgages, does not add up to a huge amount. Normally, most financial institutions should be able to absorb them with much damage. Of course, a few may have bought too much of the stuff and they will go belly-up, but that is how things normally are. Most significant financial institutions should be able to absorb those particular losses.

Here comes the securitization story, and it is not controversial either. The dilution of risk is a good thing, no doubt about it. But it is generally the case that any good thing has some drawback. In this case the drawback is that no one knows who holds how much of these bad loans. Where things got bad is that, the same as many other human beings, and maybe a little more so, financiers are prone to mood swings. When all was going well, they trusted each other as if they had gone to the same schools, which in fact they did. When the situation soured, they went at light speed to the other corner and started to suspect that everyone else was more in trouble, especially those they knew best because they went to school together. So the interbank market froze.

This is where disagreements emerge. Did the central banks do the right thing? Some observers lament that they should act as lenders of last resort, which means intervening sparingly at punishing cost. The problem with that view is that central banks did not intervene as lenders of last resort. All central banks have the responsibility of assuring the orderly functioning of the financial markets. The interbank market is the mother of all financial markets, and it was drying up. So the central banks had no choice but to restart the interbank markets. In addition, modern central banks operate by announcing an interest rate, the interbank rate. If they do not enforce that rate, they destroy their own chosen strategy, which has served them well so far. This strategy allows them to change the interbank rate any time they wish. But until they do so, they have no choice but to make that rate stick. As for punishment, who were they supposed to punish? Not a particular bank, this time. The market, then? Collective punishment is generally a bad idea. In this case, it would be a terrible idea. If central banks punish the interbank market, they punish all financial markets, and therefore they punish all those who depend on these markets, which means almost all of humanity. Even Castro and Kim Jong Il.

The next big disagreement is whether things will become worse. It is easy to build scenarios that lead to disaster. Many excellent stories circulate and, like any good horror stories, they ring true. They usually describe hedge funds with serious exposure to subprime loans as quickly trying to restore solvency by selling their best assets, pushing their value down. Even hedge funds that are not exposed to bad loans may be fighting for their lives if their clients withdraw funds, either because they are worried or because they must, given their own regulations or rules. Rating agencies are then forced to downgrade loads of assets and funds whose fundamentals are perfectly safe, simply because they are being downloaded on the market. At that stage, 1929 starts looking heavenly in comparison with what happens next. Well, that could be what is in store. But note that it does not have to be so.

Remember first that, on its own, the mortgage crisis is small beer. Recall next that most serious financial institutions must have made adequate provisions to face this long-expected crisis; some call it normalization. Note that the large central banks have shown that they have learnt the lesson from past crisis and quickly moved to provide the interbank markets with the required liquidity. The situation is basically sound. But financial markets are always subject to self-fulfilling prophecies: if they believe that things will go wrong, things go wrong. That is where we stand now.

Isn't it very frustrating to find ourselves, once again, on the verge of disaster and realize that our well-being depends on the whims of a few financiers not

particularly known for being sedate? Why can't we prevent this once and for all? The sad thing is that armies of regulators and supervisors have been doing just that for years and years. Remember Basel II, meant to be even better than Basel I? Nowadays banks are so tightly regulated that it is almost not fun any more to be a banker. Well, almost. Banking is about lending, and lending is risky. In addition, as we all know, high risk means high (expected) return. Naturally, bankers have responded to regulation by carrying on with lending, risky and not risky, but they have been subcontracting the risk that they are not supposed to hold. The great securitization wave is partly a consequence of the great regulation operation.

The deeper moral is simple. Financial markets exist to do risky things. The more risk they take, the higher the (expected) returns. You can use regulation to squeeze risk out of a segment of the market, say banks, but you do not eliminate the risk, you just move it elsewhere. New segments, say hedge funds, emerge to take over the risk and the high (expected) returns that go with it. The problem is that little is known of the new segment and its players, so the armies of regulators and supervisors that protect us look in the wrong direction because they do not know where to look. There has been much talk about regulating the hedge funds; it might happen, so the game will move elsewhere. The only way to eliminate financial crises is to fully eliminate risk. Kim Jong Il knows how: eliminate financial institutions. But that means no (expected) returns.

The subprime series, part 1: Financial crises are not going away

Stephen G. Cecchetti

Bank for International Settlements and CEPR

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This is the first in a series of four essays exploring the lessons from the subprime turmoil. It sets the stage for the series, arguing that financial crises are intrinsic to the modern economy, but both individuals and governments should make adjustments to reduce the frequency of financial crises and their impact on the broader economy.

While the crisis may not be over, we can still pause and take stock. What lessons should we take away from the turmoil that began in early August 2007? Most of what I will discuss is not new. But recent events have brought some important issues into better focus. Reflecting on the central causes of the problems we currently face leads me to conclude: there will always be a next crisis.

Its centrality to industrial economic activity, combined with a potential for abuse, has made the financial system one of the most heavily regulated parts of our economy. Through a variety of regulators and supervisors with overlapping responsibilities, governments make voluminous rules and then set out to enforce them. The idea of a laissez-faire financial system makes no sense even to most ardent champions of the free market.

Even with intense oversight by the governmental authorities – in the United States we have the Office of the Comptroller of the Currency, the Federal Deposit Insurance Corporation and the Federal Reserve, as well as state banking authorities – crises continue to come. One reason for this is the natural tendency of officials to fight the last battle, looking for systemic weaknesses revealed by the most recent crisis. So, when complex automated trading schemes were thought to have contributed to the October 1987 stockmarket crash, circuit breakers were put in place that shut down computer-based order systems when indices move by more than a certain amount. In the aftermath of the Asian crisis, the IMF created new lending facilities in an attempt to address issues of contagion – in essence, to deal with countries that were innocent victims of problems created elsewhere. And when LTCM collapsed there was a flurry of activity to understand the potential impact of what were called highly leveraged institutions.

As necessary as each of these reforms may have been, we are not going to stop tomorrow's crises by looking backwards. Financial innovators will always seek out the weakest point in the system. Innovations will both exploit flaws in the regulatory and supervisory apparatus and manipulate the inherent limitations of the

relationship between asset managers and their investor clients. The 2007 crisis provides examples of both of these. Let us look at each in turn.

Innovations exploited flaws in the regulatory and supervisory apparatus

Financial institutions have been allowed to reduce the capital that they hold by shifting assets to various legal entities that they do not own, what we now refer to as conduits and SIVs. (Every financial crisis seems to come with a new vocabulary.) Instead of owning the assets, which would have attracted a capital charge, the banks issued various guarantees to the SIVs, guarantees that did not require the banks to hold capital.

The purpose of a financial institution's capital is to act as insurance against drops in the value of its assets. The idea is that even if some portion of a bank's loan portfolio goes bad, there will still be sufficient resources to pay off depositors. Since capital is expensive, bank owners and managers are always on the lookout for ways to reduce the amount they have to hold. It is important to keep in mind that under any system of rules, clever (and very highly paid) bankers will always develop strategies for holding the risks that they want as cheaply as they can, thereby minimizing their capital.

Manipulation of the asset manager–client relationship

But this is not the only problem. Financial innovators will also seek ways in which to exploit the relationship between the ultimate investor (the principal) and the managers of the investor's assets (the agent). The problem is that the agent acts primarily in his or her personal interest, which may or may not be the same as the interest of the principal. The principal–agent problem is impossible to escape.

Think about the manager of a pension fund who is looking for a place to put some cash.

Rules, both governmental and institutional, restrict the choices to high-rated fixed-income securities. The manager finds some AAA-rated bond that has a slightly higher yield than the rest. Because of differences in liquidity risk, for example, one bond might have a yield that is 20 or 30 basis points (0.20 or 0.30 percentage points) higher. Looking at this higher-yielding option, the pension-fund manager notices that there is a very slightly higher probability of a loss. But, on closer examination, he sees that this higher-yielding bond will only start experiencing difficulties if there is a system-wide catastrophe. Knowing that in the event of crisis, he will have bigger problems than just this one bond, the manager buys it, thereby beating the benchmark against which his performance is measured. I submit that there is no way to stop this. Managers of financial institutions will always search for the boundaries defined by the regulatory apparatus, and they will find them. After all, detailed regulations are a guide for how to legally avoid the spirit of the law. And the more detailed the rules, the more ingenious the avoidance. This brand of ingenuity is very highly rewarded, so I am sure these strategies will continue.

Conclusions

So, what to do? Both individuals and government officials need to make adjustments. Individual investors need to demand more information and they need to get it in a digestible form. As individuals we should adhere to the same principle that President Ronald Reagan followed in agreements over nuclear weapons with the Soviet Union: trust, but verify. We should insist that asset managers and underwriters start by disclosing the detailed characteristics of what they are selling together with their costs and fees. This will allow us to know what we buy, as well as understand the incentives that our bankers face.

As for government officials, most of the lessons point to clarifying the relative riskiness associated with various parts of the financial system. Elsewhere I have suggested that at least some of the problems revealed by the current crisis can be ameliorated by increasing the standardization of securities and encouraging trading to migrate to organized exchanges.

Next articles

In the next essays in this series I will continue along this theme. Part 2 discusses the lesson I have taken away from the Bank of England's recent experience: that a lender of last resort is no substitute for deposit insurance. In part 3, I address whether central banks should have a direct role in financial supervision, concluding that they should. And finally, in part 4, I examine whether central banks' actions have created moral hazard, encouraging asset managers to take on more risk than is in society's interest. My answer is no.

Notes: Deposit insurance has a dramatic impact on the amount of capital a bank holds. With deposit insurance, depositors do not care about the assets on their bank's balance sheet. And without supervision from their liability holders (the depositors) there is a natural tendency to increase the risk that they take. The bank's owners and managers get the upside if the higher-risk loans and investments yield high returns, while the deposit insurer faces the downside if the risky assets fail to pay off. The response to this is to regulate banks and force them to hold capital.

The argument that follows is due to Joshua D. Coval, Jakub W. Jurek and Erik Stafford (2007), 'Economic Catastrophe Bonds', Harvard Business School Working Paper 07-102, (June).

I made this proposal initially in 'A Better Way to Organize Securities Markets', *Financial Times*, 4 October 2007, and provide more details in 'Preparing for the Next Financial Crisis' published initially at www.eurointelligence.com on 5 November 2007, and reprinted at www.voxeu.com on 18 November 2007.

The subprime series, part 2: Deposit insurance and the lender of last resort

Stephen G. Cecchetti

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The second essay in this 4-part series discusses the lesson from the Bank of England's recent experience, arguing that a lender of last resort is no substitute for a well-designed deposit insurance mechanism.

For decades a debate has been simmering over the advisability of deposit insurance. One side produces evidence that insuring deposits makes financial crises more likely.¹ These critics of deposit insurance as the first line of defence against bank panics go on to argue that the central bank, in its role as lender of last resort, can stem bank panics. Countering this is the view that, as a set of hard and fast rules, deposit insurance is more robust than discretionary central bank lending. In my view, the September 2007 bank run experienced by the British mortgage lender Northern Rock settles this debate once and for all – deposit insurance is essential to financial stability.

To understand this conclusion, we need to look carefully at experiences with central bank extensions of credit – discount lending – and at the varying experience with deposit insurance. Let's start with the lender of last resort.

Lender of last resort

In 1873 Walter Bagehot suggested that, in order to prevent the failure of solvent but illiquid financial institutions, the central bank should lend freely on good collateral at a penalty rate.² By lending freely, he meant providing liquidity on demand to any bank that asked. Good collateral would ensure that the borrowing bank was in fact solvent, and a high interest rate would penalize the bank for failing to manage its assets sufficiently cautiously. While such a system could work to stem financial contagion, it has a critical flaw. For Bagehot-style lending to work, central bank officials who approve the loan applications must be able to distinguish an illiquid from an insolvent institution. But since there are no operat-

1 This is the conclusion reached by Asli Demirgüç-Kunt and Edward Kane in their summary of international research on this issue. See their paper, 'Deposit Insurance around the Globe: Where does it Work?', *Journal of Economic Perspectives* 16 (2) (Spring 2002), pp. 175–95.

2 The original source is Walter Bagehot (1873), *Lombard Street: A Description of the Money Market*, London: Henry S. Kin & Co.

ing financial markets and no prices for financial instruments during times of crisis, computing the market value of a bank's asset is almost impossible. Because a bank will go to the central bank for a direct loan only after exhausting all opportunities to sell its assets and borrow from other banks without collateral, the need to seek a loan from the government draws its solvency into question.³

Deposit insurance

Deposit insurance operates in a way that contrasts sharply with the lender of last resort. A standard system has an explicit deposit limit that protects the bank's liability holders – usually small depositors – from loss in the event that the bank fails. Guarantees are financed by an insurance fund that collects premiums from the banks. Logic and experience teach us both that insurers have to be national in scope and backed, implicitly if not explicitly, by the national government treasury's taxing authority. Funds that are either private or provided by regional governments are simply incapable of credibly guaranteeing the deposits in the entire banking system of a country.

But as I suggested at the outset, deposit insurance has its problems. We know that insurance changes people's behaviour. Protected depositors have no incentive to monitor their bankers' behaviour. Knowing this, bankers take on more risk than they would normally, since they get the benefits while the government assumes the costs. In protecting depositors, then, deposit insurance encourages creates moral hazard – something it has in common with the lender of last resort.

Which is better?

How can we figure out whether the lender of last resort or deposit insurance works better? A physical scientist faced with such a question would run a controlled experiment, drawing inferences from variation in experimental conditions. Monetary and financial policy-makers cannot do this. Imagine a statement announcing a policy action beginning something like this: 'Having achieved our stabilization objectives, we have decided to run an experiment that will help us with further management of the economic and financial system...'

There is an alternative to irresponsible policy experiments: figuring out which policies are likely to work best requires us to look at the consequences of differences that occur on their own. Comparing the mid-September 2007 bank run experienced by a UK mortgage lender, Northern Rock, with recent events in the United States provides us with just such a natural experiment.

The US example is typical of how the loss of depositors' confidence, regardless of its source, can lead to a run. The Abacus Savings Bank serves large numbers of Chinese immigrants in New York, New Jersey and Pennsylvania. In April 2003 news spread through the Chinese-language media that one of the bank's New York

³ Another flaw in the Bagehot framework is that banks appear to attach a stigma to discount borrowing. For example, in over one-third of the days between 9 August and 21 November 2007 there were federal funds transactions reported at rates in excess of the discount lending rate. In one case, on 25 October 2007 when the lending rate was set at 5.25%, the Federal Reserve Bank of New York reported an intra-day high of 15%.

City managers had embezzled more than \$1m. Frightened depositors, unfamiliar with the safeguards in place at US banks, converged on three of the institution's branches to withdraw their balances. Because Abacus Savings was financially sound, having recently concluded its annual government examination, it was able to meet all requested withdrawals during the course of the day. In the end, as a US Treasury official observed, the real danger was that depositors might be robbed carrying large quantities of cash away from the bank. Leaving their funds in the bank would have been safer. But rumour and a lack of familiarity with government-sponsored deposit insurance – Federal Deposit Insurance insured every depositor up to \$100,000 – caused depositors to panic.⁴

Contrast this with the recent UK experience, where deposit insurance covers 100% of the first 2,000 and 90% of the next 33,000, and even then payouts can take months. Under these circumstances, the lender of last resort is an important component of the defence against runs.⁵

Central banks are extremely wary of taking on any sort of credit risk; in some cases there may be legal prohibitions against it. In lending operations, this translates into caution in the determining the acceptability of collateral. And here is where the problem occurs. In order to carry out their responsibility, central bankers must answer two important questions. First, is the borrower solvent? Second, are the assets being brought as collateral of sufficient value?⁶

The Northern Rock case brings the weaknesses of this system into stark relief. The broad outlines of the case are as follows. Northern Rock is a mortgage lender that financed its long-term lending with funds raised in short-term money markets. When, starting in mid-August 2007, the commercial paper markets came under stress, Northern Rock started having trouble issuing sufficient liabilities to support the level of assets on its balance sheet.

The natural move at this point was to seek funds from the Bank of England. But lending requires that the answer to the two questions about solvency and collateral quality are both yes. Were they for Northern Rock? I have no idea. Some combination of people in the Bank of England and the UK Financial Services Authority may have known, but I wonder. Since Northern Rock is rumoured to have had exposure to American subprime mortgages, securities for which prices were nearly impossible to come by, it is no exaggeration to suggest that no one was in a position to accurately evaluate solvency. As for the value of the collateral, again it was likely very difficult to tell.

4 See James Barron (2003), 'Chinatown Bank Endures Run as Fear Trumps Reassurances', *New York Times*, 23 April.

5 For an exhaustive description of deposit insurance systems in the EU see Robert A. Eisenbeis and George G. Kaufman (2006), 'Cross-Border Banking: Challenges for Deposit Insurance and Financial Stability in the European Union', Federal Reserve Bank of Atlanta Working Paper 2006-15 (October).

6 As an episode 20 years ago demonstrates, the Federal Reserve turns out to have substantial discretion in answering these questions. On 20 November 1985, a software error prevented the Bank of New York (BONY) from keeping track of its Treasury bond trades. For 90 minutes transactions poured in, and the bank accumulated and paid for US Treasury bonds, notes and bills. Importantly, BONY promised to make payments without actually having the funds. But when the time came to deliver the securities and collect from the buyers, BONY employees could not tell who the buyers and sellers were, or what quantities and prices they had agreed to – the information had been erased. By the end of the day, BONY had bought and failed to deliver so many securities that it was committed to paying out \$23 billion that it did not have. The Federal Reserve stepped in and made an overnight loan equal to that amount, taking virtually the entire bank – buildings, furniture and all – as collateral. See the discussion in Stephen G. Cecchetti (2008), *Money, Banking and Financial Markets*, 2nd edn, Boston, MA: McGraw-Hill, Irwin.

Problem with last-resort lending

So, here is the problem: discount lending requires discretionary evaluations based on incomplete information during a crisis. Deposit insurance is a set of pre-announced rules. The lesson I take away from this is that if you want to stop bank runs – and I think we all do – rules are better.

This all leads us to thinking more carefully about how to design deposit insurance. Here, we have quite a bit of experience. As is always the case, the details matter and not all schemes are created equal. A successful deposit-insurance system – one that insulates a commercial bank's retail customers from financial crisis – has a number of essential elements. Prime among them is the ability of supervisors to close preemptively an institution prior to insolvency. This is what, in the United States, is called 'prompt corrective action', and it is part of the detailed regulatory and supervisory apparatus that must accompany deposit insurance.

In addition to this, there is a need for quick resolution that leaves depositors unaffected. Furthermore, since deposit insurance is about keeping depositors from withdrawing their balances, there must be a mechanism whereby institutions can be closed in a way that depositors do not notice. At its peak, during the clean-up of the US savings and loan crisis, American authorities were closing depository institutions at a rate of more than two per working day – and they were doing it without any disruption to individuals' access to their deposit balances.

Returning to my conclusion, I will reiterate that this episode makes clear that a well-designed rules-based deposit insurance scheme should be the first step in protecting the banking system from future financial crises.

Subprime series, part 3: Why central banks should be financial supervisors

Stephen G. Cecchetti

Bank for International Settlements and CEPR

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The third essay in this four-part series argues that central banks should have a direct role in financial supervision.

Central bankers regularly describe price stability as an essential foundation for maximum sustainable growth. Well, financial stability is another one. In fact, without a stable, well-functioning financial system, there is no way that an economy can flourish. A well-functioning financial system is like the plumbing. When it works we take it for granted; when it does not, watch out. But, as we have seen recently, financial markets and institutions can malfunction at a moment's notice. To prevent this, governments regulate and supervise financial institutions and markets. And best practice dictates that financial stability is one of the primary objectives of the central bank.

Central banks and financial supervision

For over a decade there has been a debate over how to structure government oversight. What responsibilities should reside in the central bank? Different countries resolve this question differently. In places like Italy, the Netherlands, Portugal, the United States and New Zealand, the central bank supervises banks. By contrast, in Australia, the United Kingdom and Japan, supervision is done by an independent authority. Is one of these organizational arrangements better than the other? Does one size fit all?

The events of the summer and autumn of 2007 shed new light on this question, and my conclusion is that there is now an even stronger argument for placing supervisory authority inside the central bank. As events unfolded through August and September, it became increasingly clear that having the bank supervisors separated from the liquidity provider placed added stress on the system.¹

¹ The chronology of events is now well known, so I will not repeat them here. For a discussion of the initial stages, see my description at 'Market Liquidity and Short-term Credit: the Financial Crisis of August 2007'.

Pros and cons of separation

To understand this conclusion let me very briefly summarize the traditional arguments for and against separation of the monetary and supervisory authorities.² Starting with the former, the most compelling rationale for separation is the potential for conflict of interest. The central bank will be hesitant to impose monetary restraint out of concern for the damage it might do to the banks it supervises. The central bank will protect banks rather than the public interest. Making banks look bad makes supervisors look bad. So, allowing banks to fail would affect the central banker/supervisor's reputation.

In this same vein, Goodhart³ argues for separation based on the fact that the embarrassment of poor supervisory performance could damage the reputation of the central bank. Monetary policy-makers who are viewed as incompetent have a difficult time achieving their objectives.

Turning to the arguments against separation, there is the general question of whether a central bank can deal effectively with threats to financial stability without being a supervisor. There are a variety of reasons why the answer might be no.

First and foremost, as a supervisor, the central bank has expertise in evaluating conditions in the banking sector, in the payments systems and in capital markets more generally. During periods when financial stability is threatened, when there is the threat that problems in one institution will spread, such evaluations must be done extremely quickly.

Importantly, the central bank will be in a position to make informed decisions about the tradeoffs among its goals, knowing whether provision of liquidity will jeopardize its macroeconomic stabilization objectives, for example. They are in the best position to evaluate the long-term costs of what may be seen as short-run bailouts. Put another way, appropriate actions require that monetary policy-makers and bank supervisors internalize each others' objectives. Separation makes this difficult.

Second, separation can lead central bankers to ignore the impact of monetary policy on banking-system health. A simple example of this is the potential for capital requirements to exacerbate business-cycle fluctuations. Granted, this seems unlikely, but regardless, the argument goes as follows: when the economy starts to slow, the quality of bank assets decline. This, in turn, reduces the level of capital, increasing leverage. Banks respond by cutting back on lending, slowing the economy even further. Combatting this requires that monetary policy-makers take explicit account of banking-system health when making their decisions. And, without adequate supervisory information, there is concern that they might not.

Most relevant to the recent experience is the fact that in their day-to-day interactions with commercial banks (and other financial institutions) central bankers need to manage credit risk both in the payments system and in their lending operations. In the United States, for example, the Federal Reserve allows banks what

2 For a detailed and very thought-provoking discussion see both the text and the references in Ben S. Bernanke, 'Central banking and Bank Supervision in the United States', speech delivered at the Allied Social Science Association Annual Meeting, Chicago, Illinois, 5 January 2007.

3 See Charles Goodhart (2000), 'The Organizational Structure of Banking Supervision', Occasional Papers, no.1, Basel, Switzerland: Financial Stability Institute (November).

are known as daylight overdrafts on their reserve accounts. That is, the Fed extends very short-term credit to banks that makes payments with insufficient balances.⁴

As the lender of last resort, central banks worldwide take on credit risk. To do so responsibly requires information about the borrower. The evidence suggests that this is nearly impossible without having fast and complete access to supervisory information. An example will help to illustrate the problem policy-makers face.

An example

On 20 November 1988 a computer software error prevented the Bank of New York from keeping track of its US Treasury securities trading.⁵ For 90 minutes orders poured in and the bank made payments without having the funds as normal. But when it came time to deliver the bonds and collect from the buyers, the information had been erased from the system. By the end of the day, the Bank of New York had bought and failed to deliver so many securities that it was committed to paying out \$23 billion that it did not have. The Federal Reserve, knowing from its up-to-date supervisory records that the bank was solvent, made an emergency \$23 billion loan taking the entire bank as collateral and averting a systemic financial crisis. Importantly, only a supervisor was in a position to know that the Bank of New York's need to borrow was legitimate and did not arise from fraud.

A central bank needs to manage credit risk both in the operation of the payments system and in lending operations. In short-term lending it relies heavily on supervisory information. While this can normally be obtained from the supervisor, when an institution comes under stress it can be essential to have people in the central bank who know what is going on.

We can summarize the argument against separation as being about efficiency in the production and use of timely information on the one hand, and the ability to internalize the tradeoffs on the other. Separation means something akin to the children's game of 'telephone' or 'Chinese whispers', where a message is whispered from one child to the next, getting distorted at each step along the way. Internalization of the tradeoffs means that the central bank is best positioned to decide whether actions aimed at calming financial markets today forsake macro-economic stabilization objectives tomorrow.

I find all of this persuasive. But for those people who do not, recent events add another argument for central banks retaining supervisory powers. Looking at the Northern Rock episode, one has to wonder whether individuals would have behaved the way that they did if they had all been working inside the same institution. Recall what happened in mid-September. Shortly after the governor of the

4 Because reserve balances are not remunerated in the US system – that is, there is no interest paid on the balances banks hold at the Fed – there is an incentive to economize on the level of reserves held. This has created a system in which banks regularly overdraw their accounts early in the day, making payments prior to receiving them. The Fed has announced that starting in 2011 it will start paying interest on reserve balances, at which point daylight overdrafts seem likely to disappear.

5 At the time, computers could store only 32,000 transactions at a time. When more transactions arrived than the computer could handle, the software's counter restarted at zero. Since the counter number was the key to where the trading information was stored, the information was effectively erased. Had all the original transactions been processed before the counter restarted, there would have been no problem. See the discussion in Stephen G. Cecchetti (2008), *Money, Banking and Financial Markets*, 2nd edn, Boston, MA: McGraw-Hill, Irwin.

Bank of England, Mervyn King, sent a letter to the Treasury Committee of the House of Commons,⁶ the UK Financial Services Authority (FSA) made it known both that Northern Rock was on the verge of collapse, and that supervisors had known this for some time. Contrary to widespread perception of the position taken just a few days earlier in the governor's letter, the Bank of England was forced to make a substantial emergency loan, greatly tarnishing their public image.

Northern Rock lessons

I have no special knowledge of the merits of this particular case. Should Northern Rock have been extended this loan or forced into bankruptcy? Could the FSA have taken preemptive action to avoid reaching this point? What was in the best long-term interests of the UK public in this specific case? It will take some time to sort out the answers to these questions and determine whether specific legal changes are needed. What I will say is that things surely would have gone more smoothly had the Bank of England had supervisory authority so that the officials with intimate knowledge of Northern Rock's balance sheet would have been sitting at the table on a regular basis with the management of the central bank.

Operations in a middle of a financial crisis are more like manoeuvres during a war. And in the heat of a battle, it is essential that a single person be in charge. That is why the military is organized with a clear chain of command. Separation of supervision from the central bank is like having two generals with potentially different objectives giving orders to the same army. It is hard to see how this could possibly work.

So, as I consider the lessons that we should take away from the financial turmoil of 2007, one of them is that it makes sense to place at least some supervisory authority inside the central bank.

⁶ Mervyn King (2007), 'Turmoil in Financial Markets: What Can Central Banks Do?', paper submitted by the Governor of the Bank of England to the Treasury Committee of the UK Parliament (12 September).

Subprime series, part 4: Does well-designed monetary policy encourage risk-taking?

Stephen G. Cecchetti

Bank for International Settlements and CEPR

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The final essay examines whether central bank actions have created moral hazard, encouraging asset managers to take on more risk than is in society's interest; the answer is no.

Yes, but isn't that what it is supposed to do? In order to meet the objectives of high, stable growth and low, stable inflation, monetary policy-makers must insulate the real economy from financial-sector shocks. That is, central bankers strive to keep credit-market disturbances problems from spreading to the economy at large. This, I submit, is the most important lesson we have learned from analysing the monetary-policy failures that led to the Great Depression of the 1930s.¹

Analysis of the 2007 financial crisis has been filled with comments about moral hazard and the 'Bernanke put'. The thrust of these criticisms is that recent monetary-policy actions by the Federal Reserve provided ex-post insurance to institutions that engaged in reckless behaviour. It is claimed that such bailouts designed by policy-makers underwrite risk-taking that leads, inevitably, to the next financial crisis.

In the first essay in this series, I explain why financial crises of the sort that we have been experiencing recently have been, and are likely to continue to be, a repeated consequence of the interaction of incentives and innovation.² Here, I argue that a central bank that takes an appropriate risk-management perspective is a stabilizing force, strengthening rather than weakening the financial system.

Moral hazard

To understand this conclusion, it is useful to begin with a few definitions. Let us start with moral hazard. To nineteenth-century insurers, a moral hazard was a person who was unusually susceptible to the temptations created by insurance. That is, someone whose character made them predisposed to carelessness and fraud.³

1 This is the essential insight of Bernanke's path-breaking work collected in *Essays on the Great Depression*, Princeton, NJ: Princeton University Press, 2004.

2 See part 1 above.

3 For a fascinating history of the term 'moral hazard' see Tom Baker (1996), 'On the Genealogy of Moral Hazard,' *Texas Law Review* 75 (2) (December), pp. 237–92.

Modern (neoclassical) economics steers clear of such normative connotations, defining moral hazard as the risk that a borrower, or someone who is insured, will behave in a way that is not in the interest of the lender, or the person selling the insurance.⁴

As a general rule, the existence of insurance is a good thing, both providing diversification for individuals who cannot obtain it otherwise, and allowing risk to go to those able to bear it. The fact that people can purchase fire insurance for their homes is what makes mortgages possible. This is just one example among many of how the modern financial system improves the efficient operation of the economy.

It is important to accept that insurance changes incentives. But that is an argument for careful design, not for elimination.⁵

Bernanke put or fire insurance?

The term ‘Bernanke put’ is the descendant of the ‘Greenspan put’. My favourite source for conventional wisdom, Wikipedia, defines the latter as the ‘perceived attempt of then-chairman of the Federal Reserve Board, Greenspan, of ensuring liquidity in capital markets by lowering interest rates if necessary.’ (I did not write this entry.)⁶ The term was coined in 1998 after the Fed lowered interest rates following the collapse of the investment firm LTCM. The effect of this rate reduction was that investors borrowed funds more cheaply to invest in the securities market, thereby averting a potential downswing in the markets.⁷

I believe that critical interpretations of these actions get it exactly wrong. As Bernanke said on 31 August 2007, ‘It is not the responsibility of the Federal Reserve – nor would it be appropriate – to protect lenders and investors from the consequences of their financial decisions.’⁸ It is, however, the responsibility of the Federal Reserve, and all central banks, to make sure very bad things do not happen; protecting the public from adverse consequences of financial turmoil and reducing the volatility in the economy as a whole. That is, something exactly analogous to fire insurance.

Does it create moral hazard to make the worst possible economic outcomes extremely unlikely? The answer is surely no. We should not be forced to buy insurance against things that policy-makers can keep from happening in the first place. What should happen, however, is that individuals who take more risk face the possibility of more pain.

4 For a detailed discussion of the implications of moral hazard in finance see Chapter 11 of Stephen G. Cecchetti (2008), *Money, Banking and Financial Markets*, 2nd edn, Boston, MA: McGraw-Hill Irwin.

5 For an excellent discussion of why traditional concepts of moral hazard are not applicable to the current circumstance see Lawrence Summers (2007), ‘Moral Hazard Fundamentalists’, *Financial Times* (23 September).

6 A textbook definition of a put option goes something like this: ‘A contract that confers the right, but not the obligation, to sell a financial instrument at a predetermined price prior to the expiration date of the option.’ For someone who plans to sell the asset in the future, a put option ensures that the price at which the asset can be sold will not go down.

7 The result of the Greenspan put was that equity investors experienced substantial losses as US stock market capitalization fell from \$20 trillion at the 2001 peak to \$11 trillion a mere two years later. A 45% loss hardly seems like iron-clad insurance.

8 ‘Housing, Housing Finance, and Monetary Policy’, speech presented at the Federal Reserve Bank of Kansas City’s Economic Symposium, Jackson Hole, WY.

Returning to the current instance, we can now ask two questions. First, have central bankers' actions reduced the likelihood of the worst possible outcomes? Second, have individuals and institutions that took more risk paid a higher price?

It seems to me that the answer to both of these questions is unequivocally yes. The purpose of the Federal Reserve's actions – reducing the federal funds rate target by a total of 75 basis points and the discount rate by 125 basis points – have been aimed at making sure very bad things do not happen.⁹ And, if my reading of the news is accurate, losses are being distributed based on how much risk people have taken.

Conclusions

I have suggested we consider four concrete remedies:

- **Trust, but verify:** investors should insist that asset managers and underwriters start by disclosing both the detailed characteristics of what they are selling and their costs and fees. This will allow us to know what we buy and understand our bankers' incentives.
- **Standardization and trading:** Governments could help clarify the relative riskiness of assets by fostering the standardization of securities and encouraging trading on organized exchanges.
- **Deposit insurance:** a well-designed, rules-based deposit-insurance scheme is essential for protecting the banking system from future financial crises. Lender of last-resort actions are no substitute for deposit insurance.
- **Central banks should be financial regulators:** they should have a direct role in financial supervision. In times of financial crisis – as in times of war – good policy-making requires a single 'general' directing the operations.

My final conclusion is negative. Some observers worry that recent central bankers' responses to the subprime crisis of 2007 will encourage asset managers to take on more risk than is in society's interest. I believe that this is wrong. Punishment is being meted out to many of those whose risky behaviour led to the problems, while central banks' actions have, so far, reduced the collateral damage that this crisis could have inflicted on the economy.

⁹ Some people characterized these interest-rate reductions as a bailout. But since every debt instrument has both a buyer and a seller, when interest-rate changes create transfers, someone wins and someone loses. And, the winnings exactly cancel the losses. So, when the Federal Open Market Committee reduces the federal funds rate target, whether you win or lose depends on whether you had an existing fixed-rate loan (lenders win and borrowers lose) or either an existing adjustable-rate loan or a new loan (borrowers win and lenders lose). I cannot see how such transfers, which always exist whenever interest rates change, create a bailout.

The subprime crisis: Greenspan's legacy

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The subprime crisis has its origin in Greenspan's low interest rate policy. His successor should take care to reassure the markets in the short run without laying the foundations for a new overreaction 'à la Greenspan'.

It is difficult to predict how long the crisis in the world's financial markets will last. Its dynamics recalls that of previous crises, such as that of 1998 (the Russian default and the collapse of LTCM), which have by now been forgotten by many. An excess of liquidity (i.e. an abundance of loans at low cost) has suddenly been transformed into a dearth of liquidity; many dealers find it hard to sell the assets in their portfolios. The present crisis bears little resemblance to the 1929 Great Depression, contrary to what some politicians and commentators assert. Fortunately the Fed president, Bernanke, has studied the Great Depression in depth. According to the analysis he did as an academic,¹ the Great Depression was unleashed by a collapse of production and consumption, amplified by a drastic reduction in the supply of bank credit which came about largely because the Fed failed to act as a lender of last resort. Exactly the opposite is happening today. The world economy continues to grow at sustained rates since central banks have so far fulfilled their roles of supplying the necessary liquidity to the market. The only (perhaps non-negligible) aspect that the current crisis shares with the Great Depression is that its epicentre is the United States.

Back to the present

It is useful to disentangle the causes of the crisis. Three factors contribute to the current crisis, that was triggered by the expectation of defaults on subprime mortgages in the United States.

- The low financial literacy of US households;
- The financial innovation that has resulted in the massive securitization of illiquid assets; and

¹ Ben Bernanke (1983), 'Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression', *American Economic Review* 73, pp. 257–76.

- The low interest rate policy followed by Greenspan's Fed from 2001 to 2004.
- The third cause is by far the most important. Without Greenspan's policy, the present crisis probably would have never occurred.

Low financial literacy

The first ingredient of the crisis is a blend of bad information, financial inexperience and the myopia of consumers and investors. They fell for the prospect of getting a mortgage at rates never seen before and then extrapolating these rates out for 30 years. This myopia was encouraged and indeed exploited by banks and other lenders eager to attract and retain clients. This is surprisingly similar to what has been seen in the past when banks and intermediaries have advised their clients to invest in financial assets ill-suited to their ability to bear risk. In both cases, a biased adviser is the reflection of a clear conflict of interest in the financial industry. Financial literacy is low not only in financially backward countries (as one would expect), but also in the United States. Only two out of three Americans are familiar with the law of compound interest; less than half know how to measure the effects of inflation on the costs of indebtedness. Financial literacy is particularly low among those who have taken out subprime mortgages. The intermediaries exploited this financial illiteracy.

Securitization

The second ingredient is the pace of financial innovation during the last ten years and the securitization that it produced. Today it is easy to liquidify [[liquefy?]] a portfolio of illiquid credits (typically a combination of bank loans or mortgages) so that they can be packaged into investor portfolios. Any bank with distressed loans has used this technique to securitize its own credits. Like all financial innovations, this too has pros and cons. The advantage is that by making an illiquid credit liquid, one can achieve important efficiency gains; investors can take longer-term positions and so earn a higher return. It also spreads the risk of insolvency across a much wider group, reducing the level of risk exposure of any individual agent. But securitizations also have their disadvantages. They weaken the incentives of financial intermediaries to monitor the behaviour of the original borrower. In addition, since a credit that has become risky can be liquidated more easily, banks have less incentive to screen borrowers carefully. This opens the credit-markets doors to poor-quality borrowers.

Low interest rates

The first two factors are not new. Without the third factor – the legacy of the 'central banker of the century' – the crisis probably would have never occurred. The monetary policy of low interest rates – introduced by Greenspan in response to the post-9/11 recession and the collapse of the new economy bubble – injected an

enormous amount of liquidity into the global monetary system. This reduced short-term interest rates to 1%, their lowest level in 50 years. What is more, Greenspan spent the next two years maintaining interest rates at levels significantly below equilibrium.² Interest rates were kept at low levels for a long time, and were often negative in inflation-adjusted terms. The result was no surprise. Low returns on traditional investments pushed investors and lenders to take bigger risks to get better returns. Financial intermediaries, in search of profits, extended credit to families and companies with limited financial strength. Investors with varying degrees of expertise duly reallocated their portfolios towards more lucrative but riskier assets in an attempt to increase their wealth and preserve its purchasing power. The low borrowing rates for both short- and long-term maturity attracted throngs of borrowers, families (above all) who were seduced by the possibility of acquiring assets that had always been beyond their means. At the same time, house prices soared, ultimately encouraging the additional extension of credit; the value of real estate seemed almost guaranteed.

The song of the Keynesian sirens

Thanks, Alan! Today we are paying the cost of your overreaction to the 2001 recession. The ECB was wisely prudent and only let itself be partially tempted by Keynesian arguments for reduced interest rates (which were already absurdly low) as a tool for attacking European stagnation. Many would like the ECB to lower rates now, arguing that to avoid a new Great Depression Europe needs Keynesian policy of the type followed in the United States, the United Kingdom and Germany after the 1929 collapse.

We think it is far better to avoid repeating Greenspan's error, and to avoid monetary policies that are too accommodating for too long. At present, central banks are acting correctly by injecting liquidity into the system. In such crises, one must be afraid of fear. Expectations can unleash downward spirals that make the most pessimistic prophecies come true. In addition, the market crisis hits everyone indiscriminately – even those who did not make money by extending mortgages too readily. Last Friday's (17 August 2007) press release of the Federal Open Market Committee (FOMC) did not clarify whether the half-point cut in the discount rate was intended to merely prevent a downward expectations spiral or whether it was the prelude to yet another overreaction to the market crisis. It is important to show soon that the lesson of Greenspan's error has been learned. We should not overreact, as has happened so many times in the past, by sowing the seeds of a future crisis today.

2 See M. Lombardi and E. S. Sgherri (2007), '(Un)naturally Low? Sequential Monte Carlo Tracking of the US Natural Interest Rate', ECB Working Papers, No. 794 (August): ECB.

The impact of short-term interest rates on risk-taking: hard evidence

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Do low levels of short-term interest encourage risk-taking that can be considered excessive? Do low interest rates imply higher credit risk in the short run? In the medium run? New empirical research suggests that the answers are a resounding yes, a subtle no and a qualifying 'it depends'.

In the heat of the summer turmoil in the global financial markets, observers immediately argued that the low levels of short-term interest rates during the 2002–5 period created the conditions for excessive risk-taking and were consequently one of the main causes of these almost unprecedented credit market convulsions.^{1,2} Despite the theoretical appeal and widespread resonance of this contention,³ no detailed empirical evidence – as far as we are aware – has established a clear and direct link from monetary policy to bank risk-taking.⁴

To analyse the impact of short-term interest rates on bank risk-taking is not straightforward. Monetary policy is endogenous: when financial stability is jeopardized, for example, monetary authorities may react by lowering interest rates, making any econometric identification extremely difficult. After the collapse of LTCM in 1998, for example, the Federal Reserve reduced the federal funds rate during the ensuing period of high financial uncertainty.

An excellent setting to econometrically identify the impact of short-term interest rates on bank risk-taking is Bolivia. In recent years, the boliviano was pegged

1 For details see V. P. Ioannidou, S. Ongena and J. L. Peydró (2007), 'Monetary Policy and Subprime Lending: A Tall Tale of Low Federal Funds Rates, Hazardous Loans, and Reduced Loan Spreads', CentER - Tilburg University/ECB, mimeo. For complementary and supportive evidence using European data for over more than 20 years, see G. Jiménez, S. Ongena, J.-L. Peydró and J. Saurina (2007), 'Hazardous Times for Monetary Policy: What Do Twenty-Three Million Bank Loans Say About the Effects of Monetary Policy on Credit Risk?', CEPR DP 6514. Any views expressed are only those of the authors and should not be attributed to the ECB or the eurosystem.

2 See for example 'How Credit Got so Easy and Why It Is Tightening', front page, *Wall Street Journal*, 7 August 2007, and the VoxEU.org column by Tito Boeri and Luigi Guiso (2007), 'Subprime Crisis: Greenspan's Legacy'.

3 See K. Matsuyama (2007), 'Credit Traps and Credit Cycles', *American Economic Review* 97; G. Dell'Ariccia and R. Marquez (2006), 'Lending Booms and Lending Standards', *Journal of Finance* 61; R. Rajan (2006), 'Has Finance Made the World Riskier?', *European Financial Management* 12; C. Borio and P. Lowe (2002), 'Asset Prices, Financial and Monetary Stability: Exploring the Nexus', BIS Paper No. 114.

4 In contrast, the effects of monetary policy on the volume of credit have been widely studied and documented: B. S. Bernanke and A. S. Blinder (1992), 'The Federal Funds Rate and the Channels of Monetary Transmission', *American Economic Review* 82; B. S. Bernanke and M. Gertler (1995), 'Inside the Black Box: the Credit Channel of Monetary Policy Transmission', *Journal of Economic Perspectives* 9; A. K. Kashyap and J. C. Stein (2000), 'What Do a Million Banks Have to Say about the Transmission of Monetary Policy', *American Economic Review* 90.

to the US dollar and the financial system was highly dollarized. During this period, the proper measure of short-term interest rates in Bolivia was the US federal funds rate, which is exogenous to Bolivian economic conditions. Hence, using the Bolivian credit registry, we analyse on a loan-by-loan basis the impact of the US federal funds on risk-taking and credit risk. The registry contains detailed contract information on all loans issued by any bank operating in the country as well as several measures of bank risk-taking such as ex-post loan performance, internal credit ratings, loan rates and borrower credit history. The analysis draws from the 1999–2003 period, when the funds rate varied between 0.98% and 6.5%, and the boliviano was pegged to the US dollar.

We find that short-term interest rates affect risk-taking and credit risk. In particular, low interest rates encourage ex-ante risk-taking. Prior to loan origination, low interest rates imply that banks soften their lending standards for new loans: banks give more loans to borrowers with lower credit score and/or with bad credit history. Not only do banks take loans with higher ex-ante risk but also grant new loans that have higher ex-post credit risk, which we measure using a loan's hazard rate, that is, the default rate per unit of time. In addition, banks do not seem to price these extra risks they take. This finding suggest that our results are not driven by a higher demand for loans from risky firms (vis-a-vis less risky firms) when interest rates are low.⁵ All in all, low short-term interest rates seem to increase the banks' appetite for risk.

We also find that banks which are less-well monitored and disciplined (i.e., subject to more moral hazard) not only take on more risk but they especially take it when interest rates are low. Low rates therefore imply excessive risk-taking. When rates are low not only do these banks take on more risk, but loan spreads are further reduced at these banks despite the higher ex-post realization of credit risk.

We also analyse in a duration model how the stance and the path of interest rates affect credit risk. We find that the hazard rate increases with lower interest rates at loan origination but also increases as a result of higher rates during the life of the loan. Consequently, there is a completely different impact of lower interest rates on the credit risk of new vis-a-vis outstanding loans. In the short-term, lower interest rates reduce the total amount of credit risk of the banks, since the volume of outstanding loans is larger than the volume of new loans. In the medium term, however, very low interest rates worsen credit risk, especially if interest rates rise at least back to the 'normal' levels and the banks' portfolios are loaded with riskier loans from the era of cheap money.

Some policy implications

We find that the level of short-term interest affects bank risk-taking and the amount of credit risk in the system. Banks remain at the core of the financial system and credit risk is the most important risk banks face. Consequently, the stance and the path of monetary policy significantly affect financial stability. Indeed, very low interest rates for too long make the reversal to higher 'normal' rates haz-

⁵ In J. Stiglitz and A. Weiss (1981), 'Credit Rationing in Markets with Imperfect Information', *American Economic Review* 71, the demand for funds from risky borrowers increases when interest rates are higher.

ardous. Therefore, prudential supervision cannot act independently of the stance of monetary policy. (In fact, empirical evidence suggests that the two functions may affect and even complement the behaviour of the monetary authority.⁶) When short-term interest rates are too low and there is excessive liquidity in the financial markets, prudential standards may have to be tightened, through dynamic and forward-looking capital requirements and/or provisioning, for example.

The critical moment for financial instability comes when short-term interest rates have been unusually low for a long time and then return at least, for example, to their 'normal' levels. In fact, we find that the lower the interest rates were and the higher they move up afterwards, the worse credit risk will be. During this critical period of transition to higher interest rates, liquidity requirements should increase to offset the higher instability. When interest rates rise, in contrast, we find that bank risk-taking is reduced as lending standards get tougher. Hence, capital requirements should not be tightened then, it is too late. Regulatory capital should have been higher before this moment of rising interest rates, when the rates were low and risk-taking excessive.

All in all, our findings suggest first that prudential supervision cannot act independently of the stance and path of monetary policy; second, that wide and fast variations from low to high interest rates have a negative impact on financial stability; and third, that cheap money is not a free lunch.

6 See for example, J. Peek, E. S. Rosengren and G. M. Tootell (1999), 'Is Bank Supervision Central to Central Banking', *Quarterly Journal of Economics* 124; V. P. Ioannidou (2005), 'Does Monetary Policy Affect the Central Bank's Role in Bank Supervision?', *Journal of Financial Intermediation* 14.

Why did bank supervision fail?

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The recent financial trouble has prompted much examination of private financial institutions, but few have asked why regulatory supervision did not prevent the crisis. This article argues that supervisory failure was also due to regulatory competition between national authorities and calls for a consolidated EU authority.

The ongoing financial turmoil is spurring a large number of reports on what went wrong and how to avoid future relapses. A clear picture of why major financial institutions made big mistakes and of systematic distortions in their incentive structures is now emerging. But on a key question there is a deafening silence: why did bank supervision fail? This is worrying, because with hindsight it is becoming increasingly obvious that supervisory authorities too made some big mistakes. Understanding why this occurred is important, if we want to avoid future repetitions.

A particularly comprehensive and lucid analysis of the deep causes of the ongoing crisis is contained in the Interim Report of the Financial Stability Forum presented by Italian Central Bank Governor Mario Draghi at the G7 meeting in Tokyo. The report draws attention to three specific problems (besides the poor and fraudulent practices in the US subprime market):

- shortcomings in firms' risk management practices, in particular, too little understanding of exposure to liquidity and market risk;
- poor due diligence practices, including excessive and misplaced reliance of credit rating agencies;
- imperfect public disclosure of the links between on- and off-balance sheet items.

Of course, these are only proximate causes, and the report asks: 'Why did financial institutions make these major mistakes?' The answer given is twofold. On the one hand, poor judgement was almost certainly involved. The rapid pace of financial innovation meant that even sophisticated investors did not always fully understand the risk properties of the complex structures that were built. The systemic implications of these financial arrangements were even more poorly understood. Probably, although the report does not say this, investors were fooled into collectively overestimating the resilience of global financial markets.

On the other hand, there were systematic incentive distortions. First, the ‘originate and distribute’ business model entails obvious moral hazard problems. Second, credit-ratings agencies face a conflict of interest. Third, management compensation schemes reward myopic risk-taking behaviour; it is rational for me to under-insure against the occurrence of rare disruptive events, if my bonus only depends on short-term performance indicators.

All this is good and sound – and far from trivial. But it is only part of the story. The other part is that banking supervision did not prevent these shortcomings from occurring. Each one of the proximate causes listed above could have been prevented or at least discouraged by better and more proactive financial supervision. Supervisory authorities did not discourage the build up of off-balance sheet risk exposure, although it was often induced by regulatory arbitrage. They did not seem to care about, or they simply ignored, the implicit contingent liabilities that this entailed for banks’ balance sheets. The relevance of liquidity and market risk (as opposed to default risk) was neglected.

Insuring adequate risk management of modern complex financial institutions is a joint responsibility of the management of such institutions and of the supervisory authorities. If risk management proves inadequate, it is a joint failure, not just a management failure. Asking why supervision failed is just as relevant as asking what went wrong inside the private financial institutions.

Why did supervision fail?

Two answers can be given. The first one is bureaucratic inertia together with poor judgement. Just as it happened with sophisticated investors, the rapid pace of financial innovation may have led astray well-intentioned supervisory authorities. No one, from the top banker to the last employee of government bureaucracies, fully understood the huge risks that were piling up in these complex financial structures. Moreover, while bank regulators and supervisors are traditionally worried about capital adequacy ratios, they were just too slow to adapt their priorities and practice to the new dangers: lack of liquidity and market risk. They were also unlucky, because the financial turmoil hit them right in the transition between Basel I and Basel II. We cannot rule out that in a year or so financial supervision would have been in a position to identify and remedy the weak points in the system. Finally, light supervision might also have reflected excessive confidence in the self-regulating abilities of modern financial institutions and an ideological conviction that over-regulation was the more relevant danger to be avoided.

This explanation of why supervision failed is plausible and likely to contain important elements of truth. But it is incomplete. Much information was actually available, and there were mounting signs of concerns of too much complacency, from both individual investors and public officials. Yet the information was not acted upon. This suggests that other forces were at work.

The second possible answer is distorted incentives. Bureaucratic organizations respond to incentives, just like financial institutions and their top managers. The main suspect here is regulatory competition. Imposing sound risk management procedures raises costs. It is quite likely that the lax supervisory standards and practice also reflected the concern that the domestic industry would be hurt rela-

tive to foreign-based competitors or the fear that some institutions would shift part of their business to regulatory heavens.

What can be done to remedy these incentive problems and achieve an effective international coordination of banking supervision? To some extent, the answer can only be provided by the supervisory authorities themselves, with reference to specific and concrete details. But whatever is done, it will not completely solve the problem. The Basel frameworks have been designed to prevent this kind of harmful regulatory competition. But while Basel I is based on hard numbers, the more flexible supervision under Basel II can be implemented with different degrees of stringency at the authorities' discretion. This means that the distortions caused by regulatory competition will not go away. It is not enough to agree that supervisors need to encourage better risk management practice and the build-up of adequate liquidity buffers. One also needs to worry about whether national supervisors acting unilaterally will have the resolve and incentives to take effective actions. If their incentives were too weak just before this crisis, they will remain weak once this storm is gone.

The need for EU supervision

Worldwide coordination of bank supervision can only be achieved through informal means. But Europe can be much more ambitious. It is time to think about replacing national regulation and supervision of banks with an EU-level agency. Besides the issue of regulatory competition, there are additional and important arguments in favour of an EU-level supervisory authority. It is almost self-evident that cross-border banking requires some form of transnational or supranational supervisory entity. Moreover, while local knowledge may be important, modern financial arrangements have become so complex that there are relevant economies of scale in concentrating the needed expertise inside a single supervisory agency.

One should always be wary of taking rushed decisions during a crisis, because the likelihood of making mistakes is very high. But the case in favour of a EU-wide regulatory and supervisory regime for banks is overwhelming. The crisis and the failure of national supervisory agencies provide a unique opportunity to overcome bureaucratic and political opposition to this institutional innovation.

The subprime crisis and credit risk transfer: something amiss

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Securitization transferred credit risk from the bank's balance sheets to the market. The subprime problem became a crisis when some of this risk landed back on banks. Regulators need to find a way to deal with the off-balance sheet operations of banks that made this possible and to improve transparency concerning banks' effective exposure to risk.

By now everyone in Europe knows all about US subprime loans, ranging from 'Alt-A' to the 'ninja' variety (granted with 'no verification of income, job status or assets'). Still, it is not obvious why an even pronounced increase in delinquency rates on such loans, with the attendant losses on mortgage exposures, should have sparked a financial crisis that touched all classes of assets globally, even those relatively immune from credit risk. True, the share of the less safe loans in the issuance of mortgage-backed securities had almost doubled in the past few years. But an estimate of the direct losses of the actual and expected defaults ranges between \$100 billion and \$200 billion, relatively little, considering the valued of aggregate of financial assets (and also in comparison with \$5 trillion lost in the dotcom crisis).

We know how the crisis has unfolded.¹ After a sharp drop in the prices and market liquidity of all mortgage-backed securities, an equally sharp increase in the price of risk and spreads, and a drying-up of the issuance of all asset-backed securities, contagion extended to the short-term end of the financial market, first to a wide class of commercial paper and then to the money and interbank markets. As uncertainty and mutual mistrust spread to counterparties (even banking counterparties), overnight interest rates jumped and, as they say, cash became king. The repeated injections of liquidity on the part of various monetary authorities have so far provided only limited solace to this state of affairs. All this is clear, but the question is why a surge of subprime defaults should affect (though not disruptively for the moment) the banking system and (more worryingly) general credit conditions?

The question arises because the subprime mortgage-backed securities that sparked the crisis represent an extreme version of the credit risk transfer process in which the core banks have been engaged for a long time pursuing the 'originate

¹ A useful rendition of the events since June and up to August 2007 is in Bank of International Settlements, *BIS Quarterly Review*, September 2007.

and distribute' business model. The banks originate the loans and then distribute the underlying risk to a myriad of outside investors. This made credit 'something that is largely bought and sold on the markets, rather than held ... on the balance sheets of financial intermediaries'.² Among the undisputable merits of this model (more complete markets, a wider range of instruments available to investors, enhanced liquidity, improved allocation of resources) is that the transfer of credit risk away from banking intermediaries would make the system more resilient to financial shocks. The fragmentation of risk and its distribution to non-bank players providing liquidity in several markets would alleviate the systemic consequences and allow an easier absorption of such shocks. This, however, is not what has happened. Though the credit underlying all kinds of asset-backed securities and of credit derivatives should no longer be on the balance sheet of the originating banks, the collapse of one segment of those securities has affected and is affecting the banking system. Why is that? The answer is that part of the credit risk flowed back to some banks, though not on to their books.

This has mostly happened through the growing diffusion of conduits and SIVs.³ These are entities, off the banks' balance sheets, that invest long-term, largely in high-yield asset-backed securities and raise short-term finance by issuing correspondingly collateralized commercial paper (so-called asset-backed commercial paper). The banks provide such entities with financial guarantees that only appear below-the-line in their balance sheet, playing the role of last-resort liquidity providers if and when difficulties of refinancing arise. The precise extent of such commitments in the aggregate and for individual banks is unknown. According to market estimates reported by the BIS, outstanding asset-backed commercial paper reached a sum of \$1.5 trillion last March, of which some \$300 billion was based on mortgage-backed assets. According to another estimate, European banks have more than \$500 billion invested in asset-backed commercial-paper conduits, with German banks holding a quarter of this sum.

This crisis, however it ends, is likely to prompt ill-conceived regulatory proposals. But, if there is one field where something ought to be done, even before damning the sins of rating agencies, it is to find a way to deal with the off-balance sheet operations of banks and achieve greater transparency of their effective exposure to risk.

2 Mario Draghi, 'Monetary Policy and New Financial Instruments', Central Bank of Argentina – 2007 Money and Banking Conference. On which see *BIS Quarterly Review*, cit; Stephen Day and Agnes Molnar (2006), 'Investment Vehicles: The Advantages of Flexibility', *International Financial Law Review* (November).

3 Ivar Simensen and Ralph Atkins (2007), "'Not Uncritical': Subprime Exposure Drags down German Banks', *Financial Times* (22 August).

The crisis of 2007: some lessons from history

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17 December 2007

There is a strong tendency in the media and policy circles to view each crisis as totally new and unexpected. Financial crises, however, are as old as financial markets. Here are the lessons drawn by one of the world's leading economic historians of financial crises.

Recent financial instability triggered by the collapse of the US subprime mortgage market has many features with great resonance from financial history.

- The crisis occurred following two years of rising policy interest rates.
- Its causes include lax oversight and a relaxation of normal standards of prudent lending in a period of abnormally low interest rates.
- The default on a significant fraction of subprime mortgages has produced spillover effects round the world via the securitized mortgage derivatives into which these mortgages were bundled, to the balance sheets of hedge funds, investment banks and conduits (which are bank-owned but off their balance sheets) which intermediate between mortgage and other asset-backed commercial paper and long-term securities.
- The uncertainty about the value of the securities collateralized by these mortgages spread uncertainty about the value of commercial paper collateral and the soundness of loans for leveraged buyouts.
- All this has led to the freezing up of the interbank lending market across the world in August 2007 and substantial liquidity injections by the ECB and the Federal Reserve to avert a credit crunch from affecting the real economy.
- The credit crunch has not yet been alleviated and a recession in the United States with consequences for Europe and other countries threatens.

A historical perspective

Many of the financial institutions and instruments caught up in the crisis are part of the centuries-old phenomenon of financial innovation. The new instruments – often devised to avoid regulation – are then proved to be successful or not by the test of financial stress such as we have been recently encountering. The rise and fall of financial institutions and instruments occurs as part of a lending boom-

and-bust cycle financed by bank credit. The credit cycle is connected to the business cycle.

Irving Fisher, the famous macroeconomist, and others have told the story of a business cycle upswing driven by a displacement leading to an investment boom financed by bank credit and new credit instruments. The boom leads to a state of euphoria and possibly an asset bubble. A state of over-indebtedness develops which often ends in a bust.

A key dynamic in the crisis is information asymmetry manifest in the spread between risky and safe securities. The bust would in the past often lead to bank failures and possibly panics. The process could be short-circuited by a lender of last resort providing ample liquidity at a penalty rate.

Countercyclical monetary policy is also an integral part of the boom-bust credit cycle. For example the historical record shows that stockmarket booms occur in environments of low inflation, rising real GDP growth and low policy interest rates. As the boom progresses and inflationary pressure builds up, central banks inevitably tighten policy to trigger the ensuing crash. The story is similar for housing.

Stockmarket crashes have serious real consequences through wealth effects and possible liquidity crises. Housing busts, in addition to directly producing negative effects on the real economy, can also destabilize the banking system. These risks are present in the current housing bust.

Bordo (2007) presents some historical empirical evidence for the United States from 1921 to the present on the relationship between credit crunches, recessions, financial crises and monetary policy. I plot the monthly spreads between the Baa corporate bond rate and the ten-year Treasury constant maturity bond rate, as a measure of the financial market's assessment of credit risk. I also show NBER recession dates and major financial market events, including stockmarket crashes, financial crises and some major political events that affected financial markets. I also show policy interest rates (the federal funds rate and the discount rate).

The patterns revealed by the data show that peaks in the credit cycle proxied by the spreads are often lined up with the upper turning points of the business cycle. Also many of the events like banking crises and stockmarket crashes occur close to the peaks. Furthermore, policy rates peak very close to or before the peaks of the credit cycle.

The historical relationship for the United States between real housing prices (and other measures of the housing market), the business cycle and policy rates reveals a similar pattern. Tightening of monetary policy is associated with reversals of real housing prices and business-cycle downturns.

Financial innovation and financial crises

Historically, financial crises originate on the liability side of banks' balance sheets as depositors rush to convert deposits into currency in the face of a financial shock. In recent decades, since the advent of deposit insurance, pressure has come from the asset side. Examples include the commercial-paper market in the 1970 Penn Central crisis, emerging market debt on money centre banks in 1982 and hedge funds in the LTCM meltdown in 1998. A historical example was the 1763 crisis in the market for bills of exchange.

In many of these cases financial innovation which increased leverage and was often devised to circumvent regulations was an integral part of the story of the boom. Examples include Penn Central in 1970 with innovation in the commercial-paper market; the savings and loan crisis of the 1980s with junk bonds; LTCM with derivatives and hedge funds; and today with the securitization of subprime mortgages. In this episode risk has been shifted from the originating bank into mortgage-backed securities which bundles shaky risk with the creditworthy. Asset-backed securities were absorbed by hedge funds, offshore banks and commercial paper. The shifting of risk from the banks to the financial markets as banks tried to avoid regulated capital requirements did not reduce systemic risk and increased the risk of a more widespread meltdown. Indeed the exposure of the non-bank financial sector has ultimately put pressure on the banking system.

International spillovers

Financial crises have always had an international dimension. Contagion spreads through asset markets, international banking and the exchange-rate standard. The Baring crisis of 1890, when Argentina defaulted on its debt, is a classic historical example of contagion. Tightening by the Bank of England created the backdrop for the crisis. It led to sudden stops in lending from the European core to the periphery. This led to currency crises and debt defaults in a pattern similar to 1997–8.

The current crisis has spread between advanced countries via the holding of opaque subprime mortgage derivatives in diverse banks in Europe and elsewhere. Emerging countries have so far avoided crises because of defensive measures, especially large foreign-exchange reserves, in reaction to the 1990s meltdown. However, if the credit crunch continues and the US economy goes into recession, the emerging countries will also be affected.

Policy lessons

1. Anna Schwartz once made a distinction between real financial crises, defined as a scramble for liquidity requiring lender of last-resort action, and pseudo-crises (asset busts leading to wealth losses) which do not require the lender of last resort. The recent wealth losses by hedge funds and others represent pseudo-crises.

However, the spillover of the subprime crisis into the interbank loan market and the freezing of liquidity to the banking system have posed the threat of a real crisis and have been dealt with properly by the ECB and the Federal Reserve. By contrast, the Bank of England initially followed a strict Bagehot policy of keeping its discount window open at a penalty rate. The run on Northern Rock on 14 September 2007 and the Bank's apparent volteface likely did not reflect the failure of the Bank's lender-of-last-resort policy but perceived inadequacies in the UK's deposit insurance, the lack of coordination between the FSA and the Bank, and political pressure.

2. The Federal Reserve by cutting its Funds rate by 100 basis points between September and December has correctly followed the conventional approach to

monetary policy by temporarily putting its inflation objectives in abeyance to prevent an incipient recession. As long as the Fed's commitment to its goal of a low inflation nominal anchor is perceived to be credible, such easing should not be inflationary. However, once the threat of recession dissipates, it behooves the Fed, if it wishes to maintain its credibility, to take back the money and raise rates. The ECB and the Bank of England as of now have not cut their policy rates, although they have been countering the liquidity crisis by injecting funds into the money markets. Should the risk of recession become as serious as in the United States, they should follow the Fed's example.

3. The Fed has followed the conventional wisdom and acted reactively by dealing with the consequences of an asset boom after it has bust. However, there may be a case for the central bank in some circumstances acting in a preemptive manner to forestall a low probability event such as a national housing bust.

Finally, I speculate on whether the recent financial crisis could have been avoided if the Fed had not provided as much liquidity as it did from 2001 to 2004. The Fed injected liquidity following shocks (the tech bust, 9/11) that might lead to financial crises, but when no financial crises occurred, it permitted the additional funds to remain in the money market. It also overreacted to the threat of deflation in 2003–4, which most likely was of the 'good' (productivity-driven) variety rather than the 'bad' recessionary variety.

If, consequent upon these events, the markets had not been infused with liquidity as much as they were and for so long, then interest rates would not have been as low in recent years as they were and the housing boom which just bust may not have expanded as much as it did.

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Bordo, Michael D. (2007), 'The Crisis of 2007: The Same Old Story Only the Players have Changed', <http://michael.bordo.googlepages.com>.

Reflections on the international dimensions and policy lessons of the US subprime crisis

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15 March 2008

We may just have started to feel the pain. Asset price drops, including housing, are common markers in all the big banking crises over the past 30 years. GDP declines after such crises were both large (-2% on average) and protracted (two years to return to trend); in the five biggest crises, the numbers were -5% and three years. This article, based on the author's testimony to the Congress, picks through the causes and consequences. It argues that when it comes to 'cures', it would be far better to get the job done right than get the job done quickly.

'There is nothing new except what is forgotten.' – Mlle Rose Bertin

Financial crisis: the setting

Across countries and over the centuries, economic crises of all types follow a similar pattern.¹ An innovation emerges. Sometimes it is a new tool of science or industry, such as the diving bell, steam engine or radio. Sometimes it is a tool of financial engineering, such as the joint-stock company, junk bonds or collateralized debt obligations (CDOs). Investors may be wary at first, but then they see that extraordinary returns appear to be available on these new instruments and they rush in. Financial intermediaries – banks and investment companies – stretch their balance sheets so as not to be left out. The upward surge in asset prices continues, and that generation of financial-market participants concludes that rules have been rewritten. Risk has been tamed, and leverage is always rewarded. All too often, policy-makers assert that the asset-price boom is a vote of confidence for their regime, that this time is different. Seldom, to my knowledge, do they protest that perhaps the world has not changed and that the old rules of valuation still apply.

But the old rules do apply. The asset price rise peters out, sometimes from exhaustion on its own or sometimes because of a real shock to the economy. This exposes the weaknesses of the balance sheets of those who justified high leverage by the expectation of outsized capital gains. Many financial firms admit losses, and some ultimately fail. All those financial firms hunker down, constricting cred-

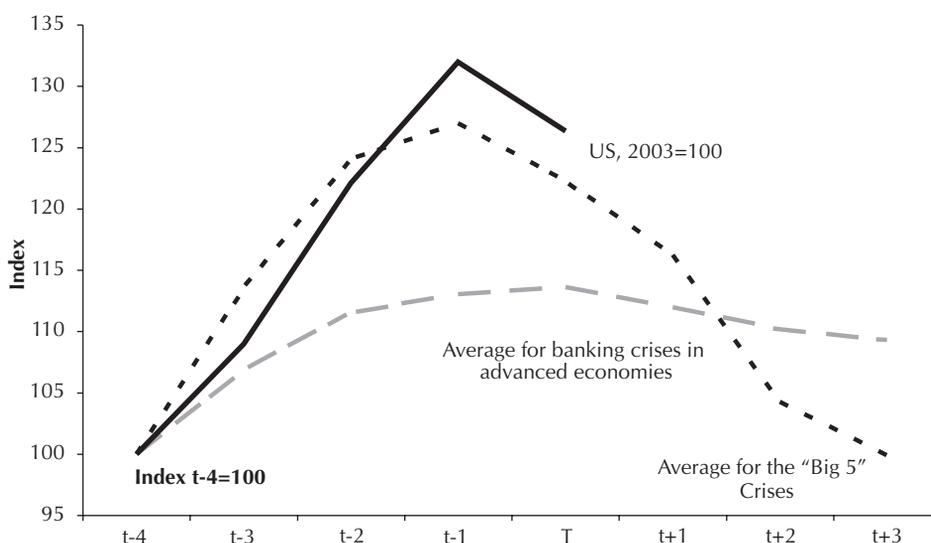
¹ Michael D. Bordo (2007), 'The Crisis of 2007: The Same Old Story Only the Players have Changed', at <http://michael.bordo.googlepages.com>.

it availability in an effort to slim their balance sheets. With wealth lower and credit harder to get, economic activity typically contracts. Only after the losses are flushed out of the financial system and often with the encouragement of lagging monetary and fiscal ease does the economy recover.

The role of the real-estate market

This sorry spectacle repeats itself in the various types of crises, but the most relevant to the present situation is the aftermath of banking crises. In recent work with Kenneth Rogoff, I documented 18 such episodes in industrial economies over the past 30 years.^{2,3} Declines in assets, including those of both houses and equities that the United States has experienced over the past year, are common markers of the onset of banking crises. In the worst five banking crises (the Big Five) in industrial countries over the past 30 years, the value of houses fell about 25% on average from their peak (Figure 1).

Figure 1 Real housing prices and banking crises



Sources: Reinhart and Rogoff (2008) and sources cited therein.

2 Carmen M. Reinhart and Kenneth S. Rogoff (2008), 'Is the 2007 U.S. Subprime Crisis So Different? An International Historical Comparison', forthcoming in *American Economic Review* (May).

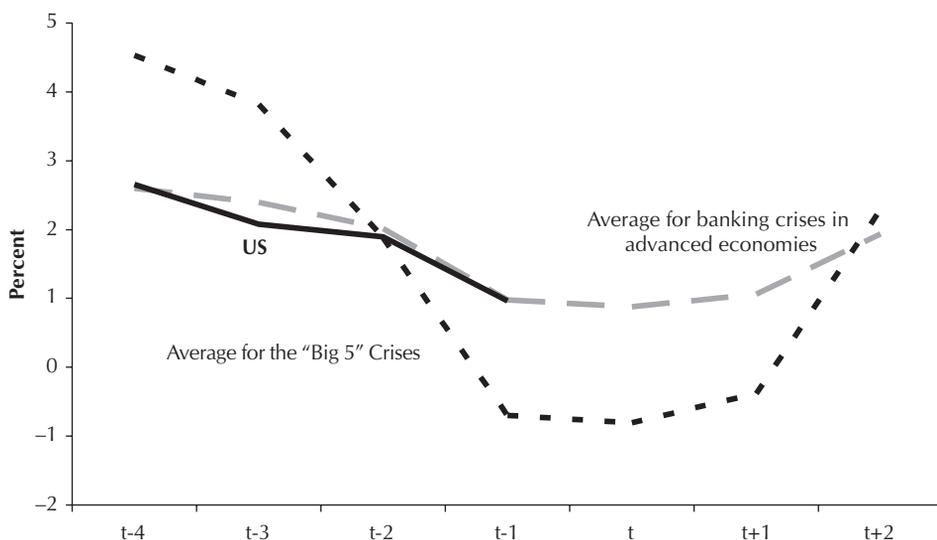
3 The five Big Five crises: Spain (1977), Norway (1987), Finland (1991), Sweden (1991) and Japan (1992) (starting year in parenthesis).

Other banking and financial crises: Australia (1989), Canada (1983), Denmark (1987), France (1994), Germany (1977), Greece (1991), Iceland (1985), Italy (1990), New Zealand (1987), United Kingdom (1974, 1991, 1995) and United States (1984).

The fallout of banking crises

The cautionary lesson for today's situation in the United States is that the decline in output after a banking crisis is both large and protracted (Figure 2). The average drop in (real per head) output growth is over 2%, and it typically takes two years to return to trend. For the five most catastrophic cases, the drop in annual output growth from peak to trough is over 5%, and growth remained well below pre-crisis trend even after three years.

Figure 2 Real GDP growth per capita and banking crises (PPP basis)



Sources: Reinhart and Rogoff (2008) and sources cited therein.

The international repercussions of the US crisis: contagion or confusion?

Swift international spillovers are not a new phenomenon. In this regard, the panic of 1907, which began in the United States and quickly spread to other advanced economies (particularly, Denmark, France, Italy, Japan and Sweden), serves as an illustrative historical benchmark for modern-day financial contagion.⁴ Like in the present episode, emerging markets were mostly spared in 1907; the only casualty in that episode was Mexico.

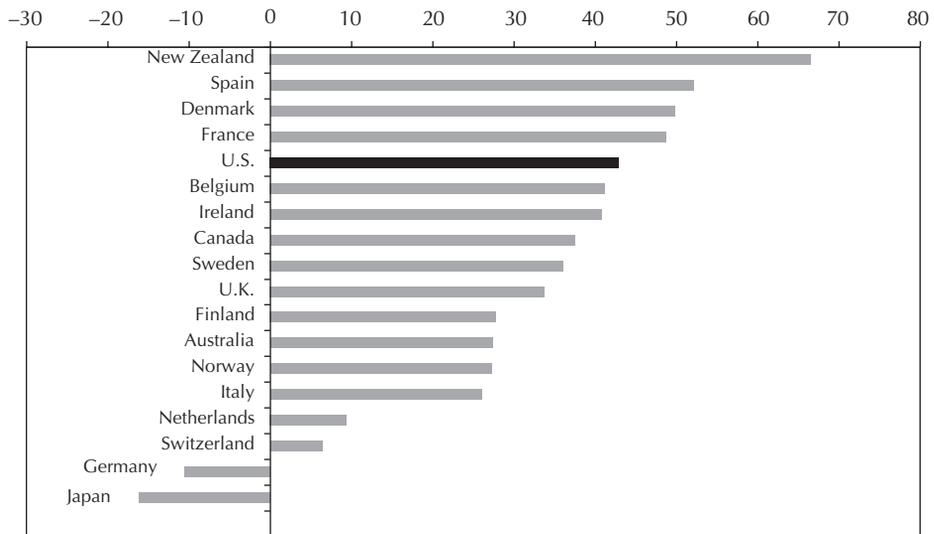
There is little doubt that the US crisis has spilled over into other markets. Two major advanced economies, Japan and Germany, have been singled out by the financial press as being particularly hard hit. There is no denying that German and Japanese financial institutions sought more attractive returns in the US subprime market, perhaps owing to the fact that profit opportunities in domestic real estate

⁴ See Reinhart and Rogoff (2008).

were limited at best and dismal at worst (Figure 3). Indeed, after the fact, it has become evident that financial institutions in these countries had non-trivial exposure to the US subprime market.⁵ This is a classic channel of transmission or contagion, through which a crisis in one country spreads across international borders. In the present context, however, contagion or spillovers are only a part of the story

If other countries are experiencing economic difficulties at the same time as the United States, it is due to the fact that many of the features that characterized the run-up to the subprime crisis in the United States were also present in many other advanced economies. Specifically, many countries in Europe and elsewhere (New Zealand, for example) were having their own home-grown real-estate bubbles (Figure 3). This, in and of itself, makes these countries vulnerable to the usual nasty consequences of asset-market crashes, irrespective of what may be happening in the United States. This cannot be pinned on the US subprime fiasco or on contagion. The odds of a correction were already present.

Figure 3 Percentage change in real housing prices 2002–2006



Sources: Shiller; BIS.

⁵ Owing to the opaqueness of balance sheets in many of these financial institutions in these countries, the full extent of exposure is still unknown.

Policy lessons: the banana republic approach to banking supervision

As Venezuela's worst banking crisis unfolded in 1994–5 (conservative estimates of the bailout costs of that crisis are at around 18% of GDP), no one in that country seemed to know whose responsibility it was to supervise the financial institutions. As is usual in most banking crises, lending standards had become lax, there was interconnected lending and there was plenty of plain old-fashioned graft. The central bank blamed the main regulatory agency (SUDEBAN), the regulatory agency blamed the deposit insurance agency (FOGADE) and everyone else blamed the central bank.⁶

At the time of that crisis, the received wisdom was that such supervisory disarray could only happen in an emerging market; advanced economies had outgrown such chaos. We now know better.

For starters, part of the supervisory responsibilities in the United States is delegated to the states, which is to say that 50 emerging-markets agencies were partially responsible for the oversight of real-estate lending. Supervisors failed to caution depositories as they offered potential borrowers unsuitable mortgages. They also acquiesced as complicated structures were booked off the balance sheet, even though, in the event, they were not treated as such by corporate headquarters at the first sign of stress. And after the fact, they have pointed to the other guy as responsible for the problem.

No doubt, change is needed in both the private and public sectors. My immediate fear is that, as in most prior episodes, the initial reaction will be overdone and inefficient. Financial institutions are already tightening the terms and standards for new lending at a ferocious clip. Rating agencies, following their pro-cyclical tendencies, will overreact as well in the effort to distract the investing public from their laxness of the past few years by strict standards going forward.⁷ Similarly, bank examiners will interpret the regulations narrowly, reinforcing the natural tendencies of depositories to tighten credit availability.

And last but not least, politicians have already turned their focus toward the financial industry. If the regulation of financial institutions needs to be revisited, there are compelling arguments to pare the multitude of regulators of depository institutions and insurance companies and to restructure the supervision of rating agencies.⁸ But the outcome of hurried debate in the heat of the moment is more likely to be legislative overreach than informed policy-making. It would be far better to get the job done right than get the job done quickly.

6 Superintendencia de Bancos y Otras Instituciones Financieras (SUDEBAN); Fondo de Garantías de Depósitos y Protección Bancaria (FOGADE) .

7 See Carmen M. Reinhart (2002), 'Sovereign Credit Ratings Before and After Financial Crises', and other chapters in R. Levich, G. Majnoni and C. M. Reinhart, eds, *Ratings, Rating Agencies and the Global Financial System*, New York: Kluwer Academic Press.

8 See Richard Portes (2008) 'Rating Agencies Reform', VoxEu.org, for an insightful discussion.

Section 2

How is the Crisis Unfolding?

Federal Reserve policy actions in August 2007: frequently asked questions (updated)

Stephen G. Cecchetti

Bank for International Settlements and CEPR

15 August 2007

A revised and updated version of the 13 August article on the basic whos and whys of what the Fed has been doing to calm financial markets.

Editors' note: This column updates the 13 August 2007 article on the same topic and includes a slightly revised version of the content of the earlier article.

Let us start with the facts. On Thursday 9 August 2007 the Federal Reserve's Open Market Trading Desk (the 'Desk') injected \$24 billion into the US banking system. This was done in two equal-sized operations, one at 8:25am and a second 70 minutes later at 9:35am.¹ On Friday 10 August 2007, the Desk was in the market three times (8:25am, 10:55am and 1:50pm), putting in a total of \$38 billion. By early this week, things seemed to have returned to normal with injections of \$2 billion on Monday and no action at all on Tuesday.

The Fed's operations came on the heels of two even larger injections by the ECB in Frankfurt. On Thursday morning it put nearly €95 billion (\$130 billion) into European financial institutions, followed by a somewhat smaller operation of €61 billion (\$83.6 billion) on Friday. Things continued to seem unsettled in Europe after the weekend, as the ECB added €47.7 billion (\$65.3 billion) on Monday (13 August), and then in two separate operations put €25 billion (\$34.2 billion) into the European banking system on Tuesday.²

How is this actually done? What are the mechanics of the transactions?

In all of these cases, the funds were put into the banking system using what are called 'repurchase agreements' or 'repos' for short. A repurchase agreement is a short-term collateralized loan in which a security is exchanged for cash, with the agreement that the parties will reverse the transaction on a specific future date at an agreed price, as soon as the next day. For example, a bank that has a US Treasury bill (T-bill) might

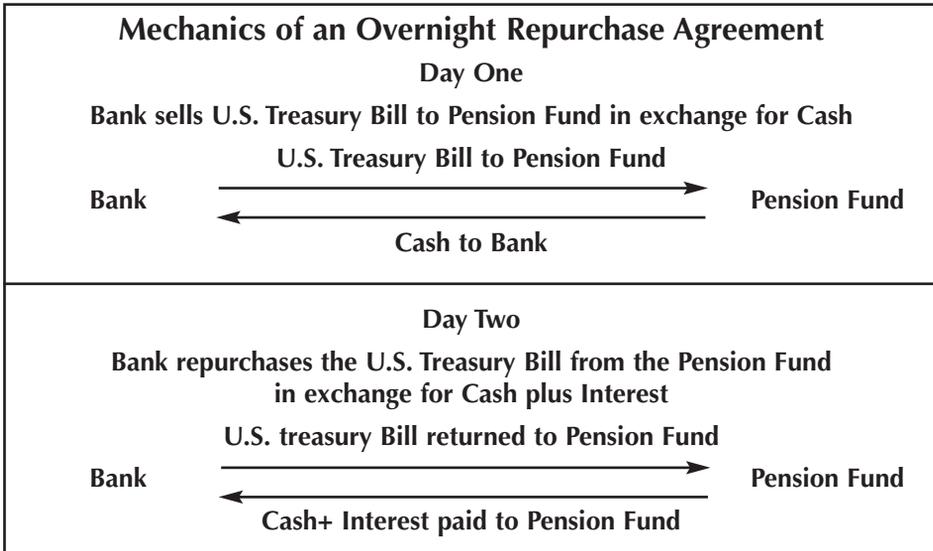
1 You can find all the details by looking at the historical data on the Federal Reserve Bank of New York's website. Every transaction is posted shortly after it is completed.

2 On Tuesday, the ECB provided €17.5 billion through its regular weekly auction plus €7.5 billion through fine-tuning operations.

need cash, while a pension fund might have cash that it does not need overnight. Through a repurchase agreement, the bank would give the T-bill to the pension fund in exchange for cash, agreeing to buy it back at the original price – repurchase it – with interest the next day. In short, the bank gets an overnight loan and the pension fund gets some extra interest. The details are shown in the figure below.

The easiest way to think about a repo is as an overnight mortgage. In the same way that you pledge your house to the bank in exchange for a loan, a financial institution pledges a bond to the Fed in exchange for funds.

Figure 1



The Desk engages in repurchase agreements every morning (the exact time varies). The quantities normally range from \$2 billion to \$20 billion.³ Most of them are overnight; but it is standard to engage in repos that are as long as 14 days. The \$35 billion on Friday 10 August 2007 was the largest since those in the aftermath of the 9/11 terrorist attacks. The record is \$81.25 billion on 14 September 2001.

How does the Fed pay for the repo? Where does it get the money?

There is an important difference between what happens when two private financial institutions engage in a repo with each other and how it works when the Fed is involved. When a pension fund engages in a repo with a bank, the pension fund transfers cash to the bank. Looking at the cash accounts of the two institutions,

³ The Desk puts out a call for bids, usually stating the term of the repo and the type of collateral that it will accept. Banks and securities dealers submit their offers – quantities and prices – and then the manager at the New York Fed decides how much to accept. There are three types of collateral: US Treasury securities, US agency securities (issued by people like Fannie Mae and the Small Business Administration) and mortgage-backed securities. Offers average roughly five times what is accepted for Treasury securities, ten times for agency securities and 15 times for mortgage-backed.

we see the level of one going down (the pension fund) and the other one (the bank) going up, for a total of zero. When the Fed engages in a repo, it simply credits a bank's reserve account, creating money (albeit for a very short time). Put another way, when the Fed wants to engage in a repo, or buy anything else for that matter, it can simply create liabilities to do it. It is a bit like having a credit card with no limit where the bill never comes.

What happens if the bonds used in the repo fall in value overnight?

When the Fed engages in a repo the bank (or securities dealer) on the other side – what is called the counterparty – agrees to repurchase the security at a fixed price regardless of what happens in the markets.⁴ It is these banks which reap the gains or suffer the losses from prices moving up or down. The only risk the Fed faces is that the counterparty in a repo goes bankrupt and cannot make good on the promise. Given that these are very large banks, and that the repos are very short-term, this is an incredibly unlikely event.

Does this have any impact on the government's budget deficit?

No. Central banks' operations have nothing to do with fiscal policy – federal government tax, expenditure and debt management policies – they are all about the interest rate and the quantity of reserves in the banking system. The Federal Reserve is the Federal Government's banker, accepting and making payments, issuing debt when it wants, etc., but they are not connected in any material way. (This is a slight simplification, as there is an esoteric connection that creates a quantitatively negligible impact.)

If the Fed has \$35 billion to help the financial system, why can't it use some of its money to help the poor?

The Fed is not spending the money on bailing out banks or hedge funds, or helping rich people. It is making fully collateralized loans that will be repaid the next day (or week). So, while it is putting the funds in today, it is taking them out almost immediately. If, instead, the Fed were to take \$35 billion in \$20-dollar bills and hand them out to the needy, this would be a permanent increase in the quantity of money in circulation. More money in the long run means higher prices – and that is inflation.

What is liquidity and why is it so important?

The publicly stated rationale for these large interventions is that liquidity has dried up. Unfortunately, liquidity is one of those terms that means different things

⁴ The Fed only engages in transactions with 21 primary dealers. Primary dealers agree to make bids or offers when the Fed conducts open-market operations, provide information to the Fed's open-market trading desk and actively participate in US Treasury securities auctions when the bonds, notes and bills are initially sold.

to different people. In the glossary to my money and banking textbook, I define liquidity as ‘the ease with which an asset can be turned into a means of payment such as money’, that is, when an asset is liquid it is easy to sell large quantities without moving market prices. When something is illiquid, it is hard to sell.

People do not want to buy things that they cannot easily sell. If they are worried that a bond they are considering buying may be difficult or expensive to sell they will lower the price they are willing to pay, assuming anyone is still willing to buy it at all. For financial markets to function well, it must be cheap and easy both to buy and to sell securities. When market liquidity dries up, the financial markets stop functioning.

This form of liquidity might be better labelled market liquidity as distinct from what I would call lending liquidity. Lending liquidity is the term I attach to the concept that was in the news until recently. You may recall reading or hearing about enormous amounts of liquidity sloshing around the system. When people said this what they meant (I think) is that loan supply was plentiful so it was easy to borrow at favourable rates. Put differently (and using some technical jargon), it meant risk spreads were low and insensitive to a borrower’s balance sheet position, that is, the risk premium a borrower paid was small and did not increase with additional borrowing, which should be riskier.

The autumn of 1998 was the last time market liquidity dried up to a greater extent than we observe today. Then it was difficult to even trade US Treasury securities, usually the most liquid financial market there is.⁵ So far, things are nowhere near that bad. In fact, with few exceptions, markets still seem to be operating normally.

\$35 billion seems like quite a bit of money. Is it?

To put the number into perspective, we have to understand what these funds are used for. When the Fed injects ‘money’ into the financial system what it does is create balances in what are called reserve accounts. That is where the money goes. Commercial banks have deposit accounts at the Fed (you and I cannot have one). Those are the bank’s checking accounts, with the exception that they do not pay interest. Because there is no interest paid on reserve balances, banks try to economize on the quantities.

Banks hold reserves at the Fed for three primary reasons. First, they are required to hold them. Second, they need it to do business, so that they can meet customer demands for withdrawals and they can make payments to other banks. Third, it is prudent to do so; reserves act as the bank’s emergency fund, they are always ready just in case disaster strikes.

⁵ We can get some sense of the operation of a market by looking at the behaviour of securities dealers who both buy and sell. When a market operates normally, the difference between the price they bidding to buy and the one they asking to sell – the bid/ask spread – is very small and they are willing to quote a single price for a large quantity. In the fall of 1998 there was a brief period when the bid/ask spread for US Treasury bonds was ten times normal and the quantity for which dealers were willing to hold the price was one-tenth normal.

So, is \$35 billion a big number or not?

Here are three numbers we could use to get some sense. First, total reserves in the US banking system for the two weeks ending 1 August 2007 averaged \$45 billion, of which roughly \$12 billion was held as deposits in reserve accounts at the Federal Reserve. The remainder is held in cash in banks' vaults – that counts, too.

Second, excess reserves, those above what the Fed requires banks to hold, usually total less than \$2 billion.

Third, on an average day, the gross quantity of interbank transfers is \$4 trillion. This includes \$1.6 trillion in funds that are transferred for the purpose of settling purchases and sales of various bonds (primarily US Treasury securities).⁶

Looking at these numbers, first we see that the Fed's action on Friday increased banking system reserves by more than 75%. More importantly, the addition of \$35 billion increased the size of reserve accounts by a factor of four. Second, the increase was more than ten times the normal level of excess reserves (although for complex reasons it is hard to know today exactly how much it will add to average excess reserves).

Finally, note the rather amazing fact that during normal times the banking system uses \$12 billion to engage in \$4 trillion in daily transactions. That is, on average a dollar in a reserve account is used more than 300 times per day. Because reserves do not pay interest, banks have a big incentive to economize on their use – this is pretty efficient. (This is also the reason that excess reserves are so low.) That banks do this every day suggests that they know how to do it; but the fact that they use the funds so many times means that if anyone starts hoarding reserves, there is the potential to disrupt the system.

The conclusion is that \$35 billion is a very big number, three times the normal level of reserves that banks hold.

Why did the banks need this money?

It is easy to explain why the Fed used open-market operations to add \$81.25 billion on 14 September 2001 in the aftermath of the 9/11 terrorist attacks. People's inability to reach their offices in downtown New York had closed some very large banks. Though those banks could still receive payments from other banks, they could not make any payments to anyone else. Funds were flowing into a few huge reserve accounts, but nothing was coming out. A few large banks were sucking up the lifeblood of the financial system.

Last week the trigger seems to have been the continued fall in the value of certain mortgage-backed securities. Mortgage-backed securities bundle a large number of mortgages together into a pool in which shares are then sold. The owners of these securities receive a share of the payments made by the homeowners who borrowed the funds. The pools create a form of insurance. In the same way that automobile insurance companies know what fraction of the insured will have collisions (but not exactly which individuals), pools of mortgages mean investors can predict the quantity of defaults and the repayment rates.

6 If you want to know more, look at: www.federalreserve.gov/paymentsystems/fedwire/default.htm

There are numerous types of mortgage-backed securities, but the ones that have run into difficulty are in what is called the subprime segment of the market. Subprime borrowers are basically people with poor credit who cannot qualify for a standard mortgage. Making loans to these people is known to be risky. And when things are risky, sometimes they do not work out. That is what happened.

But up to now, the problems in the subprime mortgage market are relatively small. Currently, losses are estimated to be at most \$35 billion, equivalent to a stockmarket decline of about 0.2%. (Last week the value of stocks traded in US markets were down a not terribly unusual 1.5%, or seven times the total expected decline in the value of these mortgages.)

What has happened is that problems in this one small part of the financial system have been seeping into the rest of the market. When people see that they have underestimated the risks in one place, they start to question their ability to accurately evaluate risks everywhere else.

Then two things happen. First, the prices of risky financial assets fall. Risk requires compensation, and the more risk there is the more compensation. Second, people flee from risky stuff that they find hard to evaluate and put their money in safe assets. This is what is called a flight to quality and it is reflected in an increase in prices of US Treasury securities and an influx of funds into the banking system.

So, the first reason the banks need the reserves is to serve the customers that have brought money into their deposit accounts.

But individuals are not the only ones who have reduced their tolerance for risk. Bankers have, too. Bankers' reduced risk tolerance shows up in two important ways, both of which result in higher demand for reserve balances. The first is that they simply want a bigger cushion against the possibility of losses. That is pretty simple.

The second reason bankers need more reserves is that they became less willing to lend their reserves to other banks. There is a huge daily interbank market for overnight loans. It is called the federal funds market and the interest rate charged on those overnight loans is the federal funds rate. The federal funds rate is the rate targeted by the Federal Reserve.⁷ On a normal day (which Thursday and Friday of last week were not) banks are willing to make loans early in the day even if it means temporarily overdrawing their accounts. (Yes, they are allowed to do that.) Banks that are overdrawn in the morning figure that if they do not receive payments to bring their reserve accounts back into positive territory by the end of the day, they can always go out and borrow it back. Well, it appears that last week banks were not willing to behave in this way and the result was that it was very difficult to borrow late in the day.

The bottom line of this very long-winded explanation is that the banks wanted to hold substantially higher level of reserves. Keeping the federal funds rate at its target level of 5¼% – that is what the desk is supposed to do every day – meant engaging in huge operations.

⁷ When the Federal Open Market Committee sets the interest rate they are really instructing the Desk to try to keep the federal funds rate determined by banks in the market for overnight loans near a specific target. The Desk does this by supplying the quantity of reserves it believes the banking system will want at that target rate. For somewhat complex reasons, the Fed does not actually determine the rate. See Chapter 18 of my textbook *Money, Banking, and Financial Markets* (pp. 462 ff., 1st edn, pp. 430ff., 2nd edn).

Did the Fed's operation have something to do with mortgages?

Yes. On Friday 10 August the Fed accepted mortgage-backed securities as collateral for the entirety of the \$35 billion in repos it engaged in that day. Importantly, though, they did not accept just any mortgage-backed securities. They only allowed dealers to pledge mortgage-backed securities issued or fully guaranteed by federal agencies.

Two comments are important here. First, this is not new. The willingness to accept mortgage-backed securities as collateral in repo goes back to changes made in advance of the year 2000 switchover. At the time there were concerns about being able to get funds into the financial system quickly, and this is one of the changes made to ensure the Desk could do that. Since then, the Fed has taken mortgage-backed securities as collateral in repo at nearly the same rate they have taken agency securities.

Nevertheless, the way in which the Fed chose to do this on Friday 10 August is notable. Normally, when the Fed sends out a message it tells dealers exactly what it wants in collateral. Each of the three categories is treated separately. So, it is common for the Desk to send out a message that it is willing to accept only Treasury securities. Alternatively it might send out a message that it will accept all three types – Treasury, agency and mortgage-backed – in three separate operations. What the Desk did on Friday is send out a message that said it would take whatever the dealers wanted to deliver. Since mortgage-backed securities are the cheapest to deliver (they have the lowest price in the market), that is what came in.

My speculation is that the Fed did this to demonstrate to the markets that it believes mortgage-backed securities are good as collateral. It was trying get financial-market participants to value mortgage pools sensibly.

Who decides to do this?

A number of people are involved in deciding the quantity of a daily open-market operation. On a normal day there is not much to decide. The Desk staff makes a recommendation in a conference call and the participants agree. (Having listened in on these calls, I can attest to the fact that they are normally not very interesting.) Last week was obviously not normal. While I doubt that the entire Federal Open Market Committee decided on the action, the committee members may have been consulted through a conference call. My guess is that the chairman, Ben Bernanke, and the New York Fed president, Timothy Geithner, had a say. What I can be sure of is that the decision was made by the Federal Reserve, not by the Secretary of the Treasury or the President of the United States.

Why did this happen when it did?

It is natural to ask whether there is some specific reason for these events to occur when they did. Can we identify a specific trigger? While we can see something has happened, as I suggested earlier, there has been no fundamental deterioration in economic conditions. In fact, in the United States there was no economic data

released on Thursday 9 August 2007. So, people did not suddenly change their view of the future.

Instead, what happened was analogous to a bank run. Bank runs can be the result of either real or imagined problems. How it works is that most people, even fairly sophisticated investors, are not in a position to assess the quality of the assets on a financial institution's balance sheet. In fact, most people do not even know what those assets are. So when we learn that one bank is in trouble, investors begin to worry about all financial institutions and start to flee. The inability to accurately value assets leads to a strong shift toward high-quality securities like Treasury bonds.

Thinking about it this way, there are two events that may have precipitated this. The first was the announcement on 2 August that the German bank, IKB Deutsche Industriebank AG, was in trouble because of investment in US subprime loans. And then, on Wednesday one of Europe's largest banks, BNP Paribas, had three funds with similar problems. Financial-market participants' response was to reduce their exposure to risky investments, on the assumption that they could not properly assess the risks. That is exactly analogous to a bank run. It is impossible to predict the exact timing of something like that.

Does this have anything to do with discount lending?

For those of you who have seen (and heard) Jim Cramer's diatribe on CNBC on Monday 3 August,⁸ you may be wondering about discount lending. The Fed has a standing offer to lend to banks (so long as they have collateral to pledge for the loan) at a rate that is 1 percentage point above the federal funds rate target of 5¼%. So, today a bank can borrow from the Fed at 6¼%. Banks, not the Fed, decide when to request a discount loan. The borrowed funds are deposited into the bank's reserve account and can be loaned out to other banks.

While we do not know for sure, it seems unlikely that discount lending increased much last week. The reason is that banks always have the option of borrowing from other banks at the federal funds rate, and the Federal Reserve Bank of New York reports that the highest rate charged for an overnight interbank loan late last week was 6%.⁹ I seriously doubt that a bank would borrow from the Fed at 6¼% when it can borrow more cheaply from another bank.

I would guess that Cramer was really arguing for an interest-rate cut. It is hard to see why that is necessary at the moment. If you cannot buy and sell the securities you own, you probably do not care if the cost of funds is 5¼% or 4%, or whatever.

8 You can watch Jim Cramer screaming on UTUBE at: <http://www.youtube.com/watch?v=SWksEJQEYVU> It is very entertaining and will take you only 3:13 minutes to watch.

9 On the day of Cramer's diatribe, there was a federal funds loan reported at 6½%, above the level at which the Fed was willing to lend. But because both the effective federal funds rate was close to the target and the (weighted) standard deviation was low, my strong suspicion is that the quantity of lending at 6½% was very low.

The ECB's operation was much larger than the Fed's. Is there a reason?

The details of the ECB's operating procedures are very different from those of the Fed, and I will not go into the details here. Nevertheless, I can provide the simplest explanation for the size of the ECB's operation. When the ECB announced its intention to provide funds on Thursday 9 August 2007 (a day it would not normally operate at all), it said that it would accept all bids at or above their 4% target. The result was that banks asked for and received €95 billion (\$130 billion) on Thursday, €61 billion (\$83.6 billion) on Friday, and €47.7 billion (\$65.3 billion) the following Monday.¹⁰

To explain this, we need to understand two things about how bank reserves work in Europe. As it turns out, 9 August is the first day of a 35 day reserve maintenance period in the eurosystem. As I mentioned earlier, banks hold reserves because they are required. The amount they need to hold depends (in a complicated way) on the size of deposits the bank held in the past. Because there can be day-to-day fluctuations in accounts, the requirement is enforced as an average over a longer period, called the maintenance period. In the United States, the maintenance period is two weeks. In Europe it varies from 28 days to 35 days.

The second point is that in Europe banks receive interest on the reserves that they are holding. The interest rate paid on required reserves is equal to the average of the overnight lending rate over the maintenance period, a rate that is almost always slightly above the ECB's target rate. (This is very different from the United States, where no interest is paid.)

Imagine that you are a bank and you hear the ECB announce that it will lend you as much as you want at the 4% target. Maybe you know something about what is going on, maybe not. In either case, when the ECB says that it is going to give you as much as you want on a day when it normally does nothing, you have to wonder what they know that you don't.

You also know that since the reserve requirement is an average over the next 35 days, if you hold a high level of reserves today, you can always make up for it with a very low level before the end of the maintenance period. And, again unlike in the United States if you are stuck with excess reserves holdings, in you can redeposit it at the ECB at a 3% interest rate. All of this makes it much cheaper for European banks to take the reserves from the ECB and helps explain why they took so much.

¹⁰ It is possible that the ECB did this to rescue a single institution that was unable to obtain credit elsewhere. I hope that is not the case.

An extensive but benign crisis?

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31 August 2007

The public is overreacting to the current turmoil in financial markets. The turmoil is most likely a situation where very specific problems are spread out extensively across investors and countries and thus the defaults are benign.

The public and (especially) the press seem to have overreacted to the current turmoil in financial markets. It is often claimed that all we are witnessing is global liquidity's revenge on Bernanke. However, if it is a financial turmoil that we are facing, it is most likely to involve an 'extensive/benign' scenario rather than an 'intensive/malign' scenario. An extensive/benign scenario is one in which a specific and quantitatively limited type of risk (i.e. the one related to the subprime borrowers in the United States) is spread out extensively across investors and countries for risk-sharing purposes (the benign phenomenon) via the instruments of financial diversification. An intensive/malign scenario, by contrast, is one associated with a large amount of risk concentrated with some investors (possibly geographically), whose deterioration usually leads to large default losses (the malign phenomenon).

In the last 20 years, financial markets have changed dramatically throughout the world, and in the United States in particular. This has been synonymous with the increased ability of risk diversification. Put differently, the new financial system has become increasingly atomistic. The physical link between the primary borrower (the family seeking a mortgage) and the lender, via a plethora of instruments of financial diversification (and of subsequent borrowers/lenders along this chain), has weakened considerably.¹ At the same time, technological improvements in the risk assessment process have substantially reduced monitoring costs for lenders.

In this context, the fact that lenders (loosely speaking) have been assuming an increasing amount of risk (the subprime loans) is a natural implication of the deepening of financial diversification. In the specifics of mortgage markets, homeownership projects that were turned down ten years ago have now become eligible for finance. With falling monitoring costs and the increased ability of diversification, financing riskier categories of borrowers can be perfectly consistent with profit maximization by lending institutions. But for previously constrained families,

¹ The IMF refers to this as a more arm's-length financial system, with an increased role for price signals and competition among lenders (see IMF WEO, September 2006).

this process of financial diversification has meant a loosening of their borrowing constraints. Overall, and from the viewpoint of economic theory, it is hard to identify this as a malign phenomenon.

It is sometimes argued that, along the financial diversification chain, it may become increasingly difficult to identify where the risk exactly lies. Certainly true, yet isn't this exactly what financial diversification is all about? Making idiosyncratic (family-specific) risk negligible relative to the aggregate pool of financed (home-ownership) projects.

From a different angle, many critics have pointed out the fallacy of this process arguing, somewhat loosely, about excessive lending or excessive amount of risk as necessary drawbacks of increased financial diversification. From the standpoint of economic theory, though, excessive is meaningful only if inefficient. In this case, one can formally identify an inefficiency if either of two phenomena arises: an increased 'adverse selection' and/or an increased moral hazard problem. Possibly only the latter qualifies as concrete in this context.

Adverse selection and moral hazard

Is it not worrying that, simply allured by the rumour that nowadays nobody is denied a mortgage, virtually any family – including the most risky ones – can decide to show up in a bank and ask for a loan? Not really, to the extent that the risk associated with this borrower is priced correctly (with this being more likely as monitoring costs fall) and is diversified through the system. After all, once again, this is what financial risk-sharing is all about.

Is it not true that, tempted by the increased opportunities of insurance, financial institutions have been taking up an increasing amount of risk? Prima facie, this may qualify as a deepening of a moral hazard problem. 'Lending institutions need to take risks by making loans, and usually the most risky loans have the potential for making the most money. A moral hazard arises if lending institutions believe that they can make risky loans that will pay handsomely if the investment turns out well but they will not have to fully pay for losses if the investment turns out badly.'²

In the specifics of our example, the insured is financial institution 'n-1' along the chain and the insurer is financial institution 'n' buying a mortgage-backed security. What is crucial about moral hazard, though, is that the insured individual (better informed than the insurer about his/her own intentions) has the ability to affect the return distribution through his/her behaviour, and does that in a distorted way. Does this apply to our case? Possibly yes. Pushed by fierce competition to make it to the 'funds-of-the-week' top-ten list of pseudo-specialized financial reviews, with the comfortable belief that one will be handsomely compensated in the case of success and allured by the possibility of diversifying much of the risk away, many funds' managers have probably taken up an increasingly inefficient amount of risk. A correct assessment of risk should instead consist in compensating funds managers just slightly less if the fund is listed at, for example, 11th in the ranking (if only such an ideal ranking existed).³ To be sure, this poten-

² Source: Wikipedia.

³ I thank Nicola Pavoni for a lively discussion on this point.

tial source of inefficiency does not lie in the funding of subprime loans per se, but in the excess funding of risky projects due to a perverse or distorted assessment of risk.

A correct quantitative assessment of the proportion of these inefficiently risky loans is extremely hard. However, one should make sure that such an assessment be made relative to the spectacular increase in financial investment experienced in the last ten years in both the US and global markets. In this vein, there is scope for cautious optimism.

House prices and aggregate compared with idiosyncratic risk

In the turmoil of comments witnessed these days, many seem to have forgotten that, in the United States, the initial cause of distress has been a fall in house prices. It is well-known that, via gains in home equity,⁴ the house price acceleration has considerably widened the access to borrowing for the average family through a series of instruments: secondary loans, mortgage-equity withdrawal, mortgage refinancing, etc. Here, though, we would like to focus the attention on two partly neglected aspects: the previous increase in house prices may not have necessarily been a bubble; a fall in house prices is the realization of an aggregate risk.

Are we really confident that the recent fall in house prices qualifies (as many have repeatedly suggested) as the pricking of a bubble? This is important; for it implies that the previous price inflation was somehow inefficient.⁵ However, serious models exist (the elaboration of which Bernanke has eminently contributed to⁶) that can rationalize an acceleration in asset prices as the result of a so-called credit cycle: an initial increase in house prices (perfectly consistent with fundamentals) strengthens the demand for borrowing (via an equity valuation effect), which in turn validates and reinforces the initial increase in prices. Of course, one cannot rule out that part of the observed run-up in house prices may have been unjustified on the basis of fundamentals. Yet, once again, such an assessment should be made relative to the acceleration that can be rationalized on the basis of a coherent model of the type described above. Furthermore, the parallel strong acceleration in housing investment experienced in the United States may have gradually led to a re-balancing of supply with demand in the housing market, finally leading to the recent fall in prices.

A possible source of concern behind the fall in house prices is that it constitutes the realization of an aggregate shock. As it hits all families simultaneously, this shock is by definition not diversifiable. Hence, there is nothing to blame the modern financial architecture here. This is definitely material for monetary policy. Fortunately nobody knows better than Bernanke about the connections between the financial and the real side of the economy. Despite the allegations of 'rooky mistake' for defining the subprime problem as contained, Bernanke is the one that

4 Technically, the difference between the existing value of the mortgage and the market value of the house.

5 Some economists would, for good reasons, also qualify bubbles as efficient outcomes, but we prefer to abstract from this point here.

6 Bernanke and Gertler (1989); Kiyotaki and Moore (1997). These papers differ in many details but both contain a financial acceleration mechanism.

has spoken recently about a possibly forthcoming negative financial acceleration problem for US families: falling house prices leading to a worsening of balance sheets, to a rise in families' finance premia and tightened borrowing conditions, with possible final effects on consumption.⁷

However, this concern may once again be worth a word of caution. In today's increasingly integrated financial markets, national (usually the prototype of aggregate) shocks assume increasingly the form of idiosyncratic shocks: country risk can in fact be shared away internationally. This entails that both the United States and Europe may end up experiencing a dampening in their growth rates of consumption/output in the near future, but of possibly contained magnitude exactly because of the benefits of international risk-sharing.

The stockmarket and Bernanke's two sides

What to make, then, of the recent turmoil in financial markets? Here we obviously enter more risky territory. One interpretation is that the usual irrational exuberance of the market may have focused excessively on the extensive rather than the benign part of the story. A spark originating from a somewhat limited niche of the US mortgage markets was after all spreading geographically with surprising pervasiveness. In this vein, the phenomenon was taking the form of a new crisis.

But could it not be that we are just facing a relative benign risk being spread out extensively (and therefore not likely to generate major losses and defaults), as opposed to a malign intensive risk concentrated geographically (as the bank crises of the past, see for instance the Massachusetts credit crunch of the 1980s)?

Is the Fed hesitating too long in cutting interest rates? The malevolent interpretation is that Bernanke is hostage to his (alleged) schizophrenic identity, with the champion of inflation targeting on the one hand, and the scholar of the Great Depression on the other. More than a weakness we may see this as a strength. The Fed may well have embraced the extensive-benign interpretation. If this was the case, it is sensible to wait that the portion of "inefficient risk" (see our point above) be naturally re-absorbed by the market, thereby avoiding an ex-post validation of any moral hazard behaviour (however relevant it might have been). Different, and more important, is the issue that pertains to spillovers that may affect the real side of the economy. The Fed is definitely anticipating a cut in the funds rate if any signals of such spillover materialise. In the meantime, the international risk-sharing scenario cited above may continue to offer a comfortable buffer of inertia, both for the Fed and the ECB.

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⁷ See <http://www.federalreserve.gov/boardDocs/speeches/2007/20070615/default.htm>

Not (yet) a ‘Minsky moment’

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23 November 2007

The subprime troubles caused a liquidity shock, but there is little reason to believe that a substantial decline in credit supply under the current circumstances will magnify the shocks and turn them into a recession. We have not (yet) arrived at a Minsky moment.

The late Hyman Minsky developed theories of financial crises as macroeconomic events. The economic logic he focused on starts with unrealistically high asset prices and buildups of leverage based on momentum effects, myopic expectations and widespread overleveraging of consumers and firms. When asset prices collapse, the negative wealth effect on aggregate demand is amplified by a “financial accelerator”; that is, collapsing credit magnifies falling aggregate demand. A severe economic decline is the outcome. Many bloggers refer to this as a “Minsky moment” (see Minsky 1975 for the real thing.)

I am sympathetic to the view that “Minsky moments” can happen (indeed, I have written numerous studies that give some support to that claim). But in my view, the correct application of the Minsky model to the current data indicates that we are not facing a Minsky moment – at least not yet. This column, which draws on a much longer analysis I have posted at the AEI, summarises my reasoning.

At the moment, it is not obvious that housing or other asset prices are collapsing, or that leverage is unsustainably large for most firms or consumers. That is not to say that the economy will avoid a slowdown, or possibly even a recession. My main focus is not on forecasting changes in housing prices or consumption, per se, which are very hard to predict. I am interested in assessing the likelihood that financial weakness will substantially magnify aggregate demand shocks through a

The current liquidity shock

We are currently experiencing a liquidity shock to the financial system, initiated by problems in the subprime mortgage market, which spread to securitisation products more generally - that is, mortgage-backed securities, asset-backed securities, and asset-backed commercial paper. Banks are being asked to increase the amount of risk that they absorb (by moving off-balance sheet assets onto the balance sheet), but the related losses that the banks have suffered are limiting somewhat the capacity of banks to absorb those risky assets. The result is a reduction in

aggregate risk capacity in the financial system as losses force those who are used to absorbing risk to sell off or close out their positions.

The financing of many risky activities unrelated to the core mortgage market shock has been reduced relative to their pre-shock levels. There are, at least temporarily, lots of “innocent bystanders” that are affected due to the aggregate scarcity of equity capital in financial intermediaries relative to the risk that needs reallocating.

The housing finance sector shock that started the current problems was small relative to the economy and financial system (estimated losses on subprime mortgages range from \$200 billion to \$400 billion). It was magnified because of the increased and imprudent use that has been made of subprime mortgage-backed securities in the creation of other securitisation conduits, and because of the connection of the instruments issued by those conduits to short-term asset-backed commercial paper.

From 2000 to 2005, the percentage of non-conforming mortgages that became securitized increased from 35% to 60%, and the volume of non-conforming origination also rose dramatically. Subprime mortgage originations rose from \$160 billion in 2001 to \$600 billion in 2006. And many of these securitized mortgages became re-securitized as backing for CDOs. As of October 2006, 39.5% of existing CDO pools covered by Moody's consisted of MBS, of which 70% were subprime or second-lien mortgages. Why did subprime issuance boom from 2002 to 2006? Foreclosure rates for subprime mortgages actually peaked in 2002, but remarkably, that experience led to a sharp acceleration in the volume of subprime originations because the 2002–3 foreclosures did not produce large losses. Losses from foreclosure were low in the liquid and appreciating housing market, and ratings agencies wrongly concluded that the forward-looking risks associated with subprime foreclosure were low. Instead, ratings should have recognized that this was an unusual environment, and that there was substantial risk implied by high foreclosure rates.

Despite CDOs' increasing reliance on subprime mortgage-backed securities and the observably low quality of these assets (i.e. high subprime foreclosure rates), CDO pools issued large amounts of highly rated debts backed by these assets. The CDO problem became magnified by the creation of additional layers of securitization involving the leveraging of the super-senior tranches of CDOs (the AAA-rated tranches issued by CDO conduits). These so-called leveraged super-senior conduits, or LSS trades, were financed in the asset-backed commercial paper (ABCP) market. Some banks structured securitizations that levered up their holdings of these super-senior tranches of CDOs by more than ten times, so that the ABCP issued by the LSS conduits was based on underlying organizer equity of only one-tenth the amount of the ABCP borrowings, with additional credit and liquidity enhancements offered to assure ABCP holders and ratings agencies. When CDO super-senior tranches turned out not to be of AAA quality, the leveraging of the CDOs multiplied the consequences of the ratings error, which was a major concern to ABCP holders of LSS conduits.

We have learned from the recent turmoil that mistakes in the pricing of fundamental risks in one market can have large consequences for the global financial system. In some ways, the global dimension of the shock is a sign of progress. Over the last two decades, securitization produced great progress in the sharing of risk

and the reduction of the amount of financial system equity capital needed to absorb risk, by establishing mechanisms for transferring risk from banks' and finance companies' balance sheets to the market, and by establishing those mechanisms in creative ways that reduced adverse selection and moral hazard costs associated with more traditional securities markets.

That progress was real and these technological innovations will persist. Mistakes were made as part of what could be called a process of learning by losing (the history of the last two decades has seen many temporary disruptions to the process of financial innovation in securitization, as discussed in Calomiris and Mason (2004), of which the current liquidity shock is clearly the most severe). Securitizations have had a bumpy ride for two decades, which is inherent in innovation, but overall the gains from reshaping risk, sharing risk and creating mechanisms that reduce the amount of equity needed per unit of risk (through improved risk measurement and management) have been large and will remain large, even if there is a substantial permanent shrinkage in securitized assets.

Risk reallocation has already produced a decline in the supply of available credit for some purposes, and this will not be fixed overnight. The financial system was devoting too little equity to intermediating risk in the mortgage securitization market. There is likely to be a long-term reduction in the amount of credit that can be supplied per unit of equity capital in the financial system.

Furthermore, the shock occurred at a time when credit spreads seemed unreasonably low to many of us, reflecting the unusually high level of liquidity in the marketplace and the willingness of investors consequently not to charge sufficiently for bearing risk. In this sense, it is quite possible that credit spreads, once disturbed from those unrealistically low levels, will remain somewhat elevated after the shock dissipates.

But these adjustments, at least for now, do not a financial crisis make. It is possible that the financial system and economy could follow the patterns of 1970, 1987 and 1998 and recover from financial disturbances quickly without experiencing a recession, even without any further monetary policy stimulus by the Fed.¹

Reasons to be cheerful

My view of the limited fallout rests on eight empirical observations.

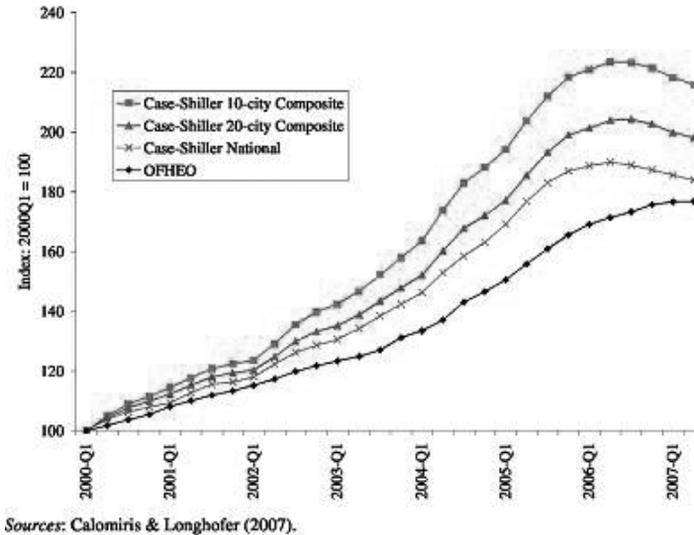
1. Housing prices may not be falling by as much as some economists say they are.

Too much weight is being attached to the Case-Shiller index as a measure of the value of the US housing stock. Stanley Longhofer and I, along with many others, have noted (Calomiris and Longhofer, 2007) that the Case-Shiller index has important flaws. Most obviously, it does not cover the entire US market, and

¹ Recent Fed actions through the discount window and the fed funds rate (discussed below) are comparable with the Fed actions in 1970, 1987 and 1998, episodes during which Fed loosening was confined to fed funds rate declines that averaged 1.1% over the three episodes. To be specific, in 1970 the fed funds rate fell from 7.80% on 17 June to 6.34% on 26 August; in 1987 it fell from 7.59% on 14 October to 6.43% on 4 November; in 1998 it fell from 5.50% on 29 September to 4.75% on 17 November.

the omitted parts of the US market seem to be doing better than the included parts. A comparison between the Case-Shiller and OFHEO (Office of Federal Housing Enterprise Oversight) housing price indexes shows that the Case-Shiller index provides a strikingly different, and less representative, picture of the US housing stock from OFHEO's index. According to the OFHEO index, as shown in Figure 1, housing prices continued to rise on average through June 2007.

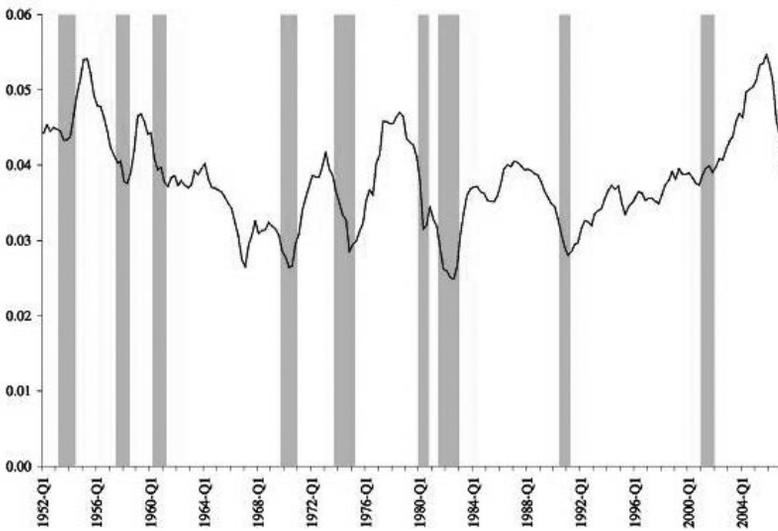
Figure 1 U.S. home price appreciation



2. Although the inventory of homes for sale has risen, housing construction activity has fallen substantially.

The reduced supply of new housing should be a positive influence on housing prices going forward. Single-family housing starts dropped 7.1% in August relative to July and are down 27.1% on a year-to-year basis. Building permits for single-family homes slumped 8.1% in August (the largest decline since March of 2002) and were down 27.9% on the year. This decline in residential investment responded to an apparent excess supply problem; homeowner vacancy rates, which had averaged 1.7% from 1985 to 2005, jumped to 2.8% in 2006. The decline thus far in residential investment by the household sector as a share of GDP has been comparable by historical standards with the declines in the 1950s, 1960s, 1970s and 1980s (most, but not all, of which preceded recessions), as shown in Figure 2.

Figure 2 Residential investment by household sector relative to GDP

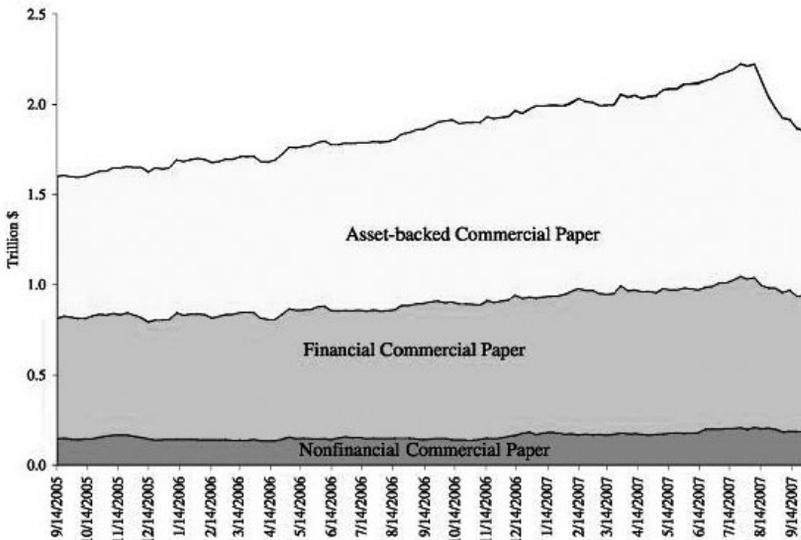


Note: Recessions are shaded.

Source: Federal Reserve Statistical Release Z.1, Table F.6.; National Bureau of Economic Research, Business Cycle Expansions and Contractions.

As Figure 3 shows, almost the entire decline in commercial paper in recent months has come from a contraction of asset-backed commercial paper, while financial commercial paper has contributed somewhat to the decline, and non-financial commercial paper has remained virtually unchanged.

Figure 3 Commercial paper outstanding (weekly, seasonally adjusted)

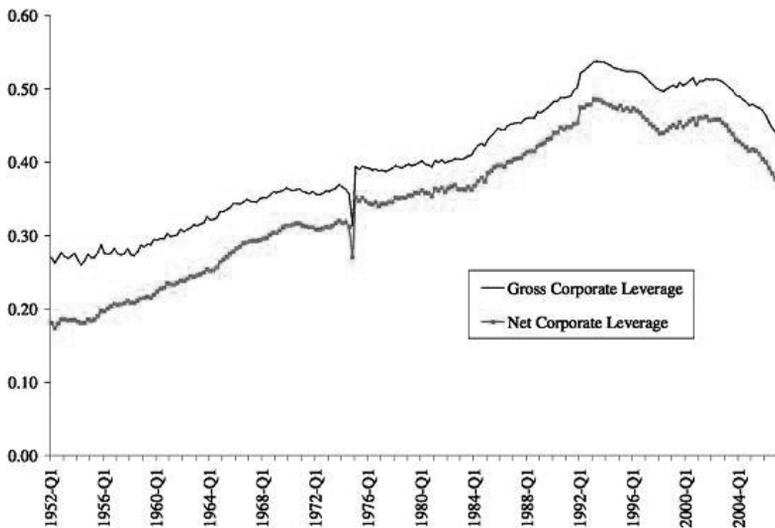


Source: Federal Reserve (<http://www.federalreserve.gov/DataDownload/Choose.aspx?rel=CP>)

This shows that the fallout from the shock has mainly to do with the loss in confidence in the architecture of securitization per se, and secondarily with rising adverse-selection costs for financial institutions, but has not produced a decline in credit availability generally.

4. Aggregate financial market indicators improved substantially in September and subsequently. Stock prices have recovered, Treasury yields rose in September as the flight to quality subsided, and bond credit spreads have fallen relative to their levels during the flight to quality (although T-bill yields remain low relative to other money market instruments).
5. As Figure 4 shows, non-financial firms are highly liquid and not overleveraged. Thus, many firms have the capacity to invest using their own resources, even if bank credit supply were to contract.

Figure 4 Corporate leverage



Note: Gross corporate leverage is defined as liabilities divided by assets. Net corporate leverage is defined as liabilities, less cash, divided by assets. Cash is defined as total financial assets, less trade receivables, consumer credit, and miscellaneous assets.

Source: Federal Reserve Statistical Release Z.1, Table B.102.

6. As Malpass (2007) has emphasized, households' wealth is at an all-time high and continues to grow. So long as employment remains strong, consumption may continue to grow despite housing-sector problems.
7. Of central importance is the healthy condition of banks. As the Fed chairman, Ben Bernanke, noted from the outset of the recent difficulties, financial institutions' balance sheets remain strong, for the most part, even under reasonable worst-case scenarios about financial-sector losses associated with the subprime fallout. Bank lending has been growing rapidly, which is accommodating the

transfer of securitized assets back on to bank balance sheets. The high capital ratios of banks at the onset of the turmoil is allowing substantial reintermediation to take place without posing a threat to the maintenance of sufficient minimum capital-to-asset ratios.

8. Banks hold much more diversified portfolios today than they used to. They are less exposed to real-estate risk than in the 1980s, and much less exposed to local real-estate risk, although US banks' exposure to residential real estate has been rising since 2000 (Wheelock, 2006).

I conclude from this evidence that the consequences of the recent shocks for the supply of bank credit may turn out to be modest.

Conclusion

The current financial market turmoil resulted from a moderate shock to the housing and mortgage markets, which was magnified by the uses of subprime mortgages in a variety of securitization vehicles, which produced a collapse of confidence in the architecture of securitization and led to a sudden need to reallocate and reduce risk in the financial system. The liquidity risks inherent in maturity-mismatched asset-backed commercial paper conduits substantially aggravated the short-term problem. Despite these disruptions, the fallout thus far in the financial system has been limited and appears to have been contained by a combination of market discipline and short-term central bank intervention. It is hard to know whether new financial shocks will occur (e.g. large housing price declines, or substantial increases in defaults on other consumer loans), or whether consumption demand will decline independent of financial system problems, but there is little reason to believe that a substantial decline in credit supply under the current circumstances will magnify the shocks and turn them into a recession. We have not (yet) arrived at a Minsky moment.

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A B and B future for subprime borrowers?

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A rate cut is unnecessary. Congress will swiftly augment the Bush bailout, adding a fiscal stimulus worth, say, 0.5% of GDP. The anticipation of relief on both the fiscal and monetary side is likely to be enough to normalize credit conditions.

Both addressed the crisis in the US subprime mortgage market, falling US house prices, the wider turmoil in credit markets and the liquidity problems encountered by a growing number of diverse financial institutions. Bernanke listed the weapons in the Fed's armoury and tried to outline the Fed's contingent reaction function to new developments. Bush outlined a small bailout for financially distressed low- and middle-income homeowners.

Bernanke's 'wait and you shall see'

Bernanke succeeded completely in what he set out to do: he said nothing at all new, but said it very well indeed. Ignoring the scholarly and historical bits, what is relevant to future Fed policy can be captured by the following quotes and their translations.

'... if current conditions persist in mortgage markets, the demand for homes could weaken further, with possible implications for the broader economy. We are following these developments closely.'

Translation: Even though the Fed is in Washington, DC, we are not asleep at the wheel.

'The Federal Reserve stands ready to take additional actions as needed to provide liquidity and promote the orderly functioning of markets.'

Translation: We can inject additional liquidity through open-market purchases or at the discount window; we can cut the discount rate or the federal funds target rate, and we can widen the range of eligible assets we will accept as collateral in repos or at the discount window.

'... the further tightening of credit conditions, if sustained, would increase the risk that the current weakness in housing could be deeper or more prolonged than previously expected, with possible adverse effects on consumer spending and the economy more generally.'

Translation: An increase in credit risk spreads represents a tightening of monetary conditions, even if the federal funds target is unchanged. The Fed is aware of this.

'... in light of recent financial developments, economic data bearing on past months or quarters may be less useful than usual for our forecasts of economic activity and inflation. Consequently, we will pay particularly close attention to the timeliest indicators, as well as information gleaned from our business and banking contacts around the country. Inevitably, the uncertainty surrounding the outlook will be greater than normal, presenting a challenge to policymakers to manage the risks to their growth and price stability objectives. The Committee continues to monitor the situation and will act as needed to limit the adverse effects on the broader economy that may arise from the disruptions in financial markets.'

Translation: Never mind what we said following the August 7 FOMC meeting. That was then. This is now. However, financial kerfuffles influence the setting of the federal funds target if and only if (and to the extent that) they have a material impact on our fundamental objectives, employment and price stability, going forward.

What does this mean for the future path of the federal funds rate?

Most of the recent real economy data are robust, including the Q2 GDP growth rate of 4.0% (annualized) and robust personal income and personal spending growth in July. However, they extend no later than July 2007, and therefore do not capture any negative effect on consumer and investment demand of the August financial turmoil.

Core PCE (Personal Consumption Expenditure) rose 0.1% in July 2007, keeping the 12-month rate of core PCE inflation at 1.9% for a second month. Headline CPI also rose by 0.1% in July, and fell to 2.1% over a 12-month period, down from 2.3% in June. While both are north of the centre of the Fed's assumed comfort zone (which ranges from 1.0% to 2.0%), they are low enough not to be a cause for embarrassment were the Fed to decide to cut the federal funds target on 6 September.

Although if I were a voting member of the FOMC, I would vote to keep the federal funds rate constant, barring exceptional developments between now and 6 September, I believe that the most likely outcome is a 25 basis points insurance cut in the federal funds rate. We shall see.

Bush's small bailout

By revealed preference, poverty in the United States is something this Republican Administration and Democratic Congress (like past Republican and Democratic Administrations and Congresses) can live with. The prospect of a couple of million homeowners being foreclosed upon during the year before a presidential election is, however, more than the body politic can stand – these people might well be voters. President Bush gave us the homeowners bailout 'lite' in his speech. The Congress will no doubt up the ante and turn this into a homeowners bailout 'premium'.

Bush first gave a concise statement of the case against bailing out mortgage lenders, speculative investors in real estate and those who unwisely took on excessive mortgages, and then outlined a plan for bailing out the last-mentioned category.

'A federal bailout of lenders would only encourage a recurrence of the problem. It's not the government's job to bail out speculators, or those who made the decision to buy a home they knew they could never afford. Yet there are many American homeowners who could get through this difficult time with a little flexibility from their lenders, or a little help from their government. So I strongly urge lenders to work with homeowners to adjust their mortgages. I believe lenders have a responsibility to help these good people to renegotiate so they can stay in their home. And today I'm going to outline a variety of steps at the federal level to help American families keep their homes.'

There are a number of aspects of these proposals that are interesting from an economic point of view.

1. It represents a cyclically appropriate, albeit small (especially in the President's version, the only one formally on the table) fiscal stimulus. That is what is meant by 'a little help from their government'.
2. The fiscal stimulus proposed by the President will be implemented mainly through quasi-fiscal means. That means that they will not come in the form of on-budget tax cuts or increases in subsidies or other public spending. Instead they will be hidden in below-market mortgage interest rates, supported by federal guarantees, through subsidized mortgage insurance and other off-budget measures that are functionally equivalent to tax cuts or subsidies. The full budgetary impacts will be obscured and delayed.

That is clear from the central role assigned to the Federal Housing Association (FHA), the cornerstone of socialized housing finance in the United States. The FHA is a government agency that started operations in 1934 and provides mortgage insurance to borrowers through a network of private-sector lenders. Bush proposes to expand a proposal he sent to the Congress 16 months ago that enables more homeowners to qualify for this insurance by lowering down-payment requirements, increasing loan limits and providing more flexibility in pricing. There are obvious elements of subsidy in this proposal.

Already about to come online is a new FHA program ('FHA-Secure') that aims to allow American homeowners who have a good credit history but cannot afford their current mortgage payments to refinance into FHA-insured mortgages. Again, the unaffordable can only be made affordable through a federal subsidy.

The President also proposes to change a feature of the US federal income system that can hit homeowners who no longer can service their mortgages hard. Debt forgiveness counts as taxable income. Assume you have \$100,000 worth of mortgage debt you cannot afford to service. Your house is worth \$100,000 to the bank. If the bank were to forgive you your mortgage debt and take your house in exchange, you would still be left with income-tax liability on the \$100,000 of forgiven debt. That seems a bit rough. Of course, you could instead sell the house to the bank for \$100,000 and use the proceeds of the sale to pay off the loan. No income tax would be due (there could, under certain conditions, be capital gains tax).

The US Congress is likely to expand on these proposals by letting Fannie May (or Federal National Mortgage Association) and Freddie Mac (or Federal Home Loan Mortgage Corporation), two government-sponsored enterprises (GSEs) created by the Congress that are at the heart of the US system of socialized housing

finance, expand the scale of their operations, specifically by increasing the upper limit on the size of the mortgages they can extend or guarantee from its current level of \$417,000.¹

3. It represents a redistribution of income towards those low- and middle-income Americans who had taken on excessive mortgage debt. The bill is paid mainly by the shareholders of the mortgage lenders (that is what is meant by 'a little flexibility from their lenders' and by the American taxpayer, who will have to foot the bill of the increased subsidies attached to the loan guarantees and subsidized mortgage insurance offered by the FHA. If the Congress manages to get Fannie Mae and Freddie Mac involved in the game, the cost to the taxpayer could turn out to be significantly higher.
4. By subsidizing excessive and imprudent borrowing, it reinforces the moral hazard faced in the future by low- and middle-income Americans pondering the size of the mortgage they can enforce (if the market-friendly President Bush is willing to bail us out today, would a more market-sceptical President Barack Obama or President Hillary Clinton not do so again tomorrow?)
5. By leaning on the lenders to show greater leniency towards delinquent mortgage borrowers than would be required by the mortgage contracts and the dictates of the competitive environment, it will discourage future subprime lending and other higher-risk mortgage lending by banks and other mortgage finance institutions. This will further increase the role of the FHA, Fannie, Freddie and the federal home loan banks, and will further strengthen the role of socialized housing finance in the United States.
6. There is a reasonable prospect that federal legislation and federal regulation and supervision of the housing-finance industry will be changed in such a way as to reduce the likelihood of the excesses, the misselling and the misrepresentations that became rampant especially during the past five years or so. There has been a serious failure by the regulators to stop the rogue mortgage lending practices that have proliferated, and not just in the subprime market. The Fed, under both Chairman Greenspan and Chairman Bernanke, is one of the institutions that bears responsibility for this regulatory fiasco.

It is, unfortunately quite likely that the legislative and regulatory changes we will get will amount to a Sarbanes-Oxley-style regulatory overshoot, that is, regulation of the 'if it moves, stop it' variety. This will discourage future lending to low-income or credit-impaired would-be homeowners even when such lending is fundamentally sound.

¹ Together, the three mortgage finance GSEs (Fannie Mae, Freddie Mac and the 12 federal home loan banks) have about \$4.4 trillion of on-balance sheet assets. Fannie Mae has about \$2.6 trillion, Freddie Mac has about \$820 billion and the 12 federal home loan banks just over \$ 1.0 trillion. Fannie Mae and Freddie Mac initiated the securitization of home mortgages.

Parochialism in US economic policy

Both sets of remarks were amazingly parochial. The President clearly believes that, except for oil and Chinese imports, the United States is a closed economy.

Bernanke's text contains a few rather generic references to global matters, but rather less than the topic deserved. Surely the fact that so much of the subprime exposure ended up in European and Asian financial institutions must have made it easier for the US lending excesses to occur. One also has to recognize the importance of international regulatory arbitrage as a factor limiting the ability of national regulators to impose even mild disclosure restrictions (let alone more serious regulatory constraints, whether for prudential or consumer protection reasons) on internationally mobile financial institutions.

Even in a lecture on 'Housing, housing finance, and monetary policy', it is surprising not to find the word 'exchange rate' in a section of the lecture titled 'The Monetary Transmission Mechanism Since the Mid-1980s'. During the past 20 years, the US economy has become increasingly open, as regards trade in both real goods and services and financial instruments. Transmission of monetary policy through the exchange rate undoubtedly has become more important, both for prices and for aggregate demand, during this period, and US real interest rates are increasingly influenced by global economic developments, as Bernanke himself has pointed out in a lecture on the global saving glut.

When all is said and done, the entire construction sector in the United States is 5% of GDP. The bit that is hurting badly, residential construction, is somewhere between 3% and 4% of GDP. Exports are 12% of GDP and growing in volume terms at an annual rate of over 11%. Import competing industries are also doing well. The combination of a sharp nominal and real depreciation of the US dollar and continued rapid growth outside the United States accounts for the strength of the externally exposed sectors of the US economy. It goes a long way towards offsetting the weakness of parts of the non-traded sectors, including housing. While increased credit risk spreads represent a tightening of monetary conditions, the weaker dollar represents a loosening of monetary conditions. There is no indication from Bernanke's address that the Fed pays any attention to this in its actual policy deliberations. This is especially surprising in view of Bernanke's recognition of these issues 'in the abstract', in some recent lectures.

Of course, housing troubles are not limited to the construction sector. Housing wealth is an important component of total net household financial wealth; real-estate assets can be collateralized and thus are a ready source of consumer spending power. Another Fed governor, Frederic Mishkin, argued at the same Jackson Hole conference that a fall in housing wealth could be a serious drag on consumer spending, assuming that the marginal propensity to spend out of housing wealth was 3.75% (a very precise number indeed).

Bottom line

A 25-bps cut in the federal funds rate on 6 September is unnecessary, likely, but by no means a foregone conclusion. By the time Congress is done augmenting the Bush small bailout of financially stressed mortgage-holders, there may be a fiscal

stimulus worth about 0.5% of GDP. With elections looming, this fiscal stimulus could be enacted rather swiftly. The anticipation of relief on both the fiscal and monetary side is likely to be enough to normalize credit conditions (albeit at spreads closer to long-run historical levels rather than at the anomalously low levels between 2003 and mid-2007) and to provide a boost to asset markets. The US housing market is in structural trouble, with excess capacity in most categories that will take years to work off. But that is a small enough part of the US economy not to be a serious drag on overall activity in the years to come.

Double counting 101: the useful distinction between inside and outside assets

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Loan defaults create financial losers and winners, but the losses are highly concentrated in highly visible financial institutions while the winners are dispersed among millions of mortgage-holders that have been written down or written off. Here is a discussion how the subprime crisis has created winners and what it means for analysis of this unfolding situation.

The sky must surely be falling on the financial sector. Reported or estimated subprime related losses have, since last summer, gone from \$50 billion, to \$100 billion, \$200 billion, \$400 billion, even \$800 billion. Let us call it \$1 trillion, or even \$2 trillion, just to be sure we catch most of the likely eventual losses. What have not been reported are the matching subprime-related gains, which without a shadow of a doubt also follow the sequence \$50 billion, \$100 billion, \$200 billion, \$400 billion, \$800 billion, \$1 trillion and \$2 trillion. Why this failure to report the subprime-related gains?

One reason, no doubt, is that there is a lot of ignorance and stupidity around; the distinction between inside and outside assets appears to be a difficult one for economists, especially financial specialists, brought up in a partial equilibrium tradition. I am lucky in having had Jim Tobin as my PhD adviser and mentor. Balance-sheet constraints, budget constraints, Walras' law, adding up constraints – it was the bread and butter of what he taught. A little general equilibrium does go a long way.

The second reason is that the losses are highly concentrated among a few hundred commercial banks, investment banks, hedge funds and similar shadow banking sector institutions, while the matching gains are widely dispersed among the many millions of homeowners who owed the mortgages that have been written down or written off. Mancur Olson's logic of collective action strikes again. In addition, many of the winners may not wish to advertise the fact that, given the amount by which the value of their property fell, they are better off now because they were able to force the bank that held their mortgage to eat their negative equity.

Inside and outside assets

For every financial asset there is a matching financial liability. That is, financial assets are inside assets. Inside assets are assets owned by a natural or legal person that are the liability of some other natural or legal person(s). Outside assets are assets of a natural or legal person that are not a liability of some other natural or legal person(s). When you net out all inside assets against the corresponding liabilities, you are left with just the outside assets, or the net wealth of the system. In a closed economy (foreign assets and liabilities present no conceptual problems but clutter up the argument), the outside assets are the stocks of natural resources (including land) and physical capital (residential housing, other structures, equipment, infrastructure), the human capital (the current and future labour endowments of the economy, that is, the resources embodied in current and future natural persons) and the productive resources (goodwill, synergy, monopoly power) embodied in legal persons such as incorporated firms.

There is an interesting argument about whether the labour endowments of the unborn should be included among a society's outside assets. In a society without hereditary slavery, future endowments of labour embodied in natural persons yet to be born are not owned by anyone alive today, and therefore do not constitute private wealth. They can, however, be viewed as part of the tax base, because the institution of the state (and the associated power to tax) is likely to endure as long as mankind. That issue will have to wait till some future occasion to be treated in earnest.

So residential property is an outside asset and constitutes net wealth. A mortgage is a liability of the homeowner and an asset of the mortgage lender (bank). The mortgage held by the bank is an inside asset and does not constitute net wealth.

Assume the bank securitizes the mortgages by selling them to an SPV that pools them and issues mortgage-backed securities against them (residential mortgage-backed securities or RMBS). Securities backed by residential mortgages are a liability of the SPV that issued them and an (inside) asset of whoever holds them, say an SIV owned by another bank. The SPV has as (inside) assets the mortgages it bought from the originator. The mortgages are still liabilities of the homeowner borrower. All CDOs backed by subprime mortgages (or by Alt-A or prime mortgages), by credit card receivables or by car loans are inside assets for which there is a matching liability. They are not net wealth. The cars themselves are net wealth.

Even a fall in outside residential housing wealth does not make you worse off

The US residential housing stock at the beginning of 2007 was worth around \$23 billion. Let us assume that its value has declined by 10%. There has therefore been a reduction in the value of this outside asset of \$2.3 trillion. I have argued elsewhere ('Housing wealth isn't wealth', 'OK then, housing wealth is wealth, but not NET wealth!' and 'The coming decline in UK house prices: how large and how helpful?') that because this outside asset yields its future income stream in kind,

in the form of consumable housing services, and because on average, homeowners expect to consume (over their lifetime) the housing services yielded by the stock of housing they own, a change in the value of residential property on average does not make anyone better off.

A fall in house prices redistributes wealth from those long housing (for whom the value of the house they own, the present discounted value of the future actual or imputed rental income of the property, exceeds the present discounted value of the future housing services they plan to consume) to those short housing (for whom the value of the house they own is lower than the present discounted value of the future housing services they plan to consume). Simply put, a decline in house prices redistributes wealth from landlords to tenants. On average, an American household is a tenant in its own home. Changes in house prices do not make the average American better or worse off, unless there is a lot of ownership in US housing by non-resident foreigners, in which case a decline in house prices would make the average US resident better off. The same point has been made by many others, including Mike Buchanan and Themistoklis Fiotakis.¹ It is also a viewpoint that, subject to all the aforementioned qualifications and further qualifications to be mentioned below) is shared by Mervyn King, the governor of the Bank of England, who first explained the issue to me in 1997.

This argument is false if the decline in house prices reflects the bursting of a bubble rather than a reduction in its fundamental value (the present value of future rentals). In that case the homeowners lose the bubble value, without a corresponding gain for the tenants through a lower present value of future rents. Other necessary qualifications come from the fact that the average expected remaining lifetime of housing consumers is likely to be less than the remaining lifespan of the existing stock of residential property. This is certainly true if the durability of the land is taken into account. In that case a fall in house prices can hurt homeowners more than it helps renters. But with reasonable discount rates, this effect is probably not very large.

Even if there is no net wealth effect from a change in home prices, this does not mean it will not have any behavioural effect. Unlike human capital, housing wealth can be collateralized. A lower value of residential housing, even if it does not make you worse off, may lower the amount you can borrow against the security of your property. Mortgage equity withdrawal becomes more restricted. This means that, through this credit or liquidity channel, falling house prices will have a temporary depressing effect on consumer demand (approximately, the level of consumer spending goes up with the change in house prices).

What banks lose on mortgages, mortgage borrowers gain

What follows is independent of whether you buy the argument that a change in house prices does not make the average American household worse off or better off. Mortgages, like any other IOU, secured or unsecured, are inside assets. If the value of the asset goes down for the investor (the bank holding the mortgage), the

¹ M. Buchanan and T. Fiotakis (2004), 'House Prices: A Threat to Global Recovery or Part of the Necessary Rebalancing?', Goldman Sachs Global Economics Paper No. 114 (15 July).

value of the liability goes down for the borrower (the homeowner who took out the mortgage with the bank). There is no change in net wealth, no economy-wide net wealth effect.

There has been \$800 billion worth of redistribution from banks and other mortgage lenders (and/or from those who invested in securities backed by the mortgages) to those who took out the mortgages (and/or from those who issued the mortgage-backed securities). The same is true for changes (up or down) in the value of any financial claim, bonds, options, CDS, complex financial structures like ABSs (Asset Backed Securities), CDOs (Collateralised Debt Obligations), CBOs (Collateralised Bond Obligations) or any of the other alphabet-soup financial instruments. Changes in the value of inside assets, like RMBS (Residential Mortgage-Backed Securities), represent pure redistribution between those who hold them and those who issue them; the point is most easily seen for options and other derivatives. All financial claims can, of course, be viewed as derivatives that are in zero net supply.

Redistribution can matter for aggregate demand. It will not, in general be neutral. But the non-neutralities have to be documented and substantiated carefully. The size of the losses on inside assets by themselves (multiple trillions no doubt before this crisis is over) bears no necessary relationship to the size of the aggregate demand effects.

Asymmetries

1. The person owing a debt (a mortgage, in the subprime case) may not value it in the same way as the person owning it. In other areas there have been spectacular examples of this. Most workers enrolled in defined-benefit company pension plans probably put a positive present discounted value on their expected future stream of pension benefits. For a long time, the companies that owed the matching liabilities kept them off-balance sheet. Out of sight, out of mind, and before long these future pension liabilities were not viewed as liabilities at all. The realization that they were indeed unsecured liabilities has crippled much of the US domestic steel and automobile industry.
2. When default risk increases but default has not (yet) occurred, the marked-to-market value of the bank's asset (the mortgage) goes down, but the borrower is still servicing the debt in full. While the homeowner owing the mortgage should also mentally mark it to market, that is, allow for the prospect that (s)he will service the mortgage in full in the future, the continuing full debt service in the present may, because of liquidity and cashflow constraints, restrain household spending.
3. Consider a household that purchases a home worth \$400,000 with \$100,000 of its own money and a mortgage of \$300,000 secured against the property. Assume the price of the home halves as soon as the purchase is completed. With negative equity of \$100,000 the homeowner chooses to default. The mortgage now is worth nothing. The bank forecloses, repossesses the house and sells it for \$200,000, spending \$50,000 in the process.

The loss of net wealth as a result of the price collapse and the subsequent default and repossession is \$250,000: the \$200,000 reduction in the value of the house and the \$50,000 repossession costs (lawyers, bailiffs, etc.). The homeowner loses \$100,000, his original, pre-price collapse equity in the house, the difference between what he paid for the house and the value of the mortgage he took out. The bank loses \$150,000, the sum of the \$100,000 excess of the value of the mortgage over the post-collapse low price of the house and the \$50,000 real foreclosure costs. The \$300,000 mortgage is an inside asset, an asset to the bank and a liability to the homeowner-borrower. When it gets wiped out, the borrower gains (by no longer having to service the debt) what the lender loses.

The legal event of default and foreclosure, however, is certainly not neutral. In this case it triggers the repossession procedure that uses up \$50,000 of real resources. This waste of real resources would, however, constitute aggregate demand in a Keynesian-digging-holes-and-filling-them-again sense, a form of private provision of pointless public works.

4. Continuing the previous example, how does the redistribution, following the default, of \$100,000 from the bank to the defaulting borrower – the write-off of the excess of the face value of the mortgage over the new low value of the house – affect aggregate demand?

There is one transmission channel that suggests it is likely, had this redistribution not taken place, that demand would have fallen more than it does following the default. The homeowner-borrower is likely to have a higher marginal propensity to spend out of current resources than the owners of the bank, since residential mortgage borrowers are more likely to be liquidity-constrained than the shareholders of the mortgage lender.

5. Finally, we have to allow for the effect of the mortgage default on the willingness and ability of the bank to make new loans and to roll over existing loans. Clearly, the write-off or write-down of the mortgage will put pressure on the bank's capital adequacy. The bank can respond by reducing its dividends, by issuing additional equity or by curtailing lending. The greatest threat to economic activity presumably comes from new lending.

The magnitude of the effect on demand of a cut in bank lending depends of course on who the banks are lending to and what the borrower uses the funds for. If they are lending to other financial intermediaries who are, directly or indirectly, lending back to our banks, then there can be a graceful contraction of the credit pyramid, a multi-layered deleveraging without much effect on the real economy. If bank A lends \$1 trillion to bank B, which then lends the same \$1 trillion back to bank A again, there could be a lot of gross deleveraging without any substantive impact on anything that matters.

With a few more non-bank intermediaries tossed in between banks A and B, such intra-financial sector lending and borrowing (often involving complex structured products) has represented a growing share of bank and financial sector business this past decade.

A group of people cannot get richer by shining each other's shoes or taking in each other's laundry. Similarly, financial institutions (intermediaries) cannot get richer by lending to each other. They can only get richer by intermediating, that is, by lending to the real economy. Of course, a more efficient structure of intermediation adds to the productive potential of the economy (by better matching savers with profitable investment opportunities), but the degree of efficiency of the structure of intermediation (markets and institutions) needs bear no relation to the gross volumes of inside assets issued by the financial intermediaries.

Somehow, the financial markets and those buying shares in financial intermediaries forgot about the mutual shining of shoes theorem. A bubble or Ponzi [[explain?]] finance scheme developed that caused the gross value of intermediation and leverage in the financial sector to rise massively. When the bubble burst, there was a loss of net wealth equal to the bubble component in the valuation of the financial sector. The subsequent deleveraging and contraction of balance sheets do not, however, destroy net wealth.

Some of the lending of the financial sector went to the real economy: households and non-financial corporations. There will undoubtedly be an increase in the cost and a reduction in the availability of such lending beyond what we have seen already. The effect of this on spending by households and non-financial firms (consumption and investment) is not, of course, equal to the reduction in bank lending to these sectors.

There are other outside sources of funds for non-financial corporates, and both households and firms can maintain spending by reducing household saving and corporate retained profits respectively. So there is many a slip between the cup of the massive deleveraging and inside asset blowout in the banking and non-bank financial sector on the one hand and, on the other hand, the lip of private consumption and investment. I consider the estimate of David Greenlaw, Jan Hatzius, Anil K Kashyap and Hyun Song Shin in their paper 'Leveraged Losses: Lessons from the Mortgage Market Meltdown', that a one dollar loss in bank assets reduces spending on goods and services in the long run by just under 44 cents, to be an order of magnitude too large; it also is bound to be far from a structural effect, that is, an effect invariant under plausible changes in the economic environment driving these two endogenous variables.

A little statistical rant (don't read unless you are interested in identification, endogeneity and simultaneity).

The authors calculate/calibrate a value for the ratio of total credit to end-users (either the non-leveraged sector or just households and non-financial corporates) to the total assets of the leveraged sector (banks, the brokerage sector, hedge funds, Fannie Mae and Freddie Mac, and savings institutions and credit unions). They then treat this ratio as a constant, which means that once they have the change in the value of the total assets of the leveraged sector, they know the change in credit to the end-users.

The next step is the empirical estimation of a correlation between the growth rate in (real) credit to end-users and the growth rate of real GDP.

There are just too many ways to poke holes in the empirical argument. To start with, as noted by the authors, the credit variable used domestic non-financial

debt, includes financing from non-leveraged entities and therefore does not correspond to the credit variable of the theoretical story.

More painfully, the authors seem blithely unaware of the difference between causation and correlation, or prediction and causation. What they perform is, effectively, half of what statistically minded economists call a Granger causality test but should be called a test of incremental predictive content. They run a regression of real GDP growth on its own past values and on past values of real credit growth and find that past real credit growth has some predictive power over future GDP growth, over and above the predictive power contained in the history of real GDP growth itself: past real credit growth helps predict, that is, Granger-cause, real GDP growth. Lagged real credit growth is (barely) statistically significant at the usual significance level (5%).

When you do this kind of regression for dividends or corporate earnings and stock values, you find that stock values Granger-cause (help predict) future dividends. Of course, anticipated future dividends determine (cause) equity prices, so causation is the opposite from Granger causation.

The authors are undeterred and treat the estimate of GDP growth on credit growth as a deep structural parameter.

The authors recognize the issue but completely fail to address it. They use the so-called TED spread (the price difference between three-month futures contracts for US Treasuries and three-month contracts for eurodollars having identical expiration months, a measure of bank default risk) and a survey-based measure of banks' willingness to lend as statistical instruments for credit growth.

Instruments are variables that are highly correlated with the variable that you are trying to purge of endogeneity and simultaneity problems, but independent of the random disturbance in the equation you are estimating.

It is a well-known but ruthlessly suppressed fact in the econometrics profession that there are no instruments, there is just implicit theorizing. The correlation between the instruments and the variable to be instrumented (credit growth in this case) can of course be tested and reported, but the second key assumption – independence of the instruments from the disturbance term in the GDP growth equation – is untestable and simply has to be maintained.

Without boring the readers (if I still have any) with further details of why the empirical work is, at best, utterly unconvincing, let me report that the 3.0% contraction in credit growth (\$ 910 billion) to the end-users which the authors assume will result from the decline in the assets of the leveraged sector, will according to their instrumented equation reduce real GDP growth by 1.3 percentage point over the following year, the 44 cents mentioned earlier.

The authors could be right about the effect of deleveraging in the leveraged sector on real GDP growth, but the paper presents no evidence to support that view.

How do we value the outside assets?

In the case of residential property, house prices (the sum of the value of land and structures) provide all the relevant information. For physical capital, there is the problem that part of it (publicly owned infrastructure) is not priced anywhere. For privately owned capital, the asset should be valued at the present discounted value

of its future earnings. Where the capital is held by unincorporated businesses or by unlisted companies, it is very hard to get an estimate of their value. When capital equipment is owned by listed corporations, it will contribute to the market value of the corporation, but only in conjunction with the goodwill and other going concern value of this legal person. The stock market value of the firm will not do either, unless the firm is 100% equity-financed. Otherwise we have to add the value of the company's net financial debt to its equity. Valuing human capital (the present value of current and future labour earnings, either of those currently alive or of current and future generations) is a bit of a nightmare.

There can be little doubt, however, that net wealth in the United States (and to a lesser extent in the rest of the North Atlantic region) has taken a beating. The value of the residential housing stock and of commercial property is down. The value of corporate debt plus equity is down. With employment falling and subdued wage growth, the value of human capital is also likely to be down, unless the appropriate stochastic discount factors act very strangely.

So let us quantify these net wealth effects of changes in the value of outside assets. Let us also study the distributional effects of the massive changes in the values of inside assets. But let us not forget that for every loser in the valuation game for inside assets there is a matching winner, and that the asymmetries do not all point to a stronger negative effect on demand. Defaulting mortgage borrowers, in particular, are likely to have high marginal propensities to spend out of current resources. Not having to service their mortgage debt any longer could give a major boost to consumer spending.

Conclusion

Things are tough enough without us exaggerating the problems through egregious double, triple, quadruple and higher multiple counting. Economic prospects for the United States are poor, but nowhere near as bad as the growing crescendo of the moans emitted by the losers in the inside asset revaluation game would have us believe.

Bagehot, central banking and the financial crisis

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The current crisis is a modern form of a traditional banking crisis. The 125-year-old Bagehot's doctrine tells us how governments should react: lend to solvent but illiquid financial institutions. While easy to state, the doctrine is hard to apply. The key question to assess the future consequences of current central-bank policy is whether the subprime mortgage crisis arises in the context of a moderate or a severe underlying moral hazard problem.

The present financial crisis poses two main questions: whether it is similar to past crises and how central banks should intervene to preserve the stability of the system.

The current financial turmoil seems extraordinary because it has unexpectedly affected the heart of the functioning of our sophisticated money markets. Despite the Northern Rock episode, the main contours of the current crisis seem very distant from scenes of crises past where newspapers were full of photos of depositors queuing to withdraw their money during a panic. Yet this crisis is just a modern-market form of a traditional banking crisis.

An old-fashioned bank run happened if enough people tried to withdraw their funds from a bank; even if the bank was solvent, it might not be able to meet all the withdrawals and thus the fear of bank failure could become a self-fulfilling prophecy. In the current crisis, participants in the interbank market take the place of long queues of withdrawers. They have stopped extending credit to other banks that they suspect to have been contaminated by the subprime loans and which therefore may face solvency problems. The commercial-bond market and SIVs are facing similar trouble.

Both the old and new forms of crisis have at their heart a coordination problem. In the current one, participants in the interbank market and in the commercial-bond market do not renew their credit because of fear others will not either. Witness the demise of the investment bank Bear Stearns at the heart of the dealing on SIVs.

In reaction, central banks have intervened massively, injecting liquidity and allowing banks to access fresh cash at the discount window in exchange for collateral that includes the illiquid packages of mortgage obligations. Have central banks done the right thing or are they provoking the next wave of excessive risk-taking by bailing out banks and markets? Is monetary policy the only tool available for the central bank to address the market crisis?

Bagehot's wisdom

Bagehot advocated in 1873 that a lender of last resort in a crisis should lend at a penalty rate to solvent but illiquid banks that have adequate collateral. The doctrine has been criticized as having no place in our modern interbank market, but this is wrong. Bagehot's prescription aims to eliminate the coordination problem of investors at the base of the crisis. It is still a useful guide for action when the interbank market stalls.¹ It makes clear that discount-window lending to entities in need may be necessary in a crisis.

Bagehot's doctrine, however, is easy to state and hard to apply. It requires the central bank to distinguish between institutions that are insolvent and those that are merely illiquid. It also requires them to assess the collateral offered. Central banks, because of information limitations, are bound to make mistakes, losing face and money in the process. This does not mean they should not try.

Poor collateral versus massive liquidity

The collateral should be valued under normal circumstances, that is, in a situation where the coordination failure of investors does not occur. This involves a judgement call in which the central bank values the illiquid assets. A central bank that only takes high-quality collateral will be safe, but will have to inject much more liquidity and/or set lower interest rates to stabilize the market. This may fuel future speculative behaviour. Some of this may have happened in the Greenspan era, in the aftermath of the crisis in Russia and LTCM, and after the crash of the technological bubble. The ECB and the Federal Reserve have accepted now partially illiquid collateral that the market would not. This seems appropriate and releases pressure to lower interest rates to solve the problem, something that should be done only if there are signs of deterioration in the real economy. The problem is that central banks are extending the lender-of-last-resort facility outside the realm of traditional banks to entities, like Bear Stearns, that they do not supervise and, therefore, on which they do not have first-hand information. How does the Fed know whether Bear Stearns or other similar institutions are solvent? It seems that the Fed is not following Bagehot's doctrine here.

Finally, if banks and investors are bailed out now, why should they be careful next time? This is the moral hazard problem: help to the market that is optimal once the crisis starts has perverse effects in the incentives of market players at the investment stage. The issue is that only when the moral hazard problem is moderate does it pay to eliminate completely the coordination failure of investors with central bank help. When the moral hazard problem is severe, a certain degree of coordination failure of investors – that is, allowing some crises – is optimal to maintain discipline when investing and, amending Bagehot, some barely solvent institutions should not be helped.

Therefore, a key question to assess the future consequences of current central-bank policy is whether the subprime mortgage crisis arises in the context of a

¹ See X. Vives and J. C. Rochet (2004) 'Coordination Failures and the Lender of Last Resort: Was Bagehot Right after all?', *Journal of the European Economic Association*.

moderate or a severe underlying moral hazard problem. The important extent of asymmetric information in this market points to a severe problem. Be as it may, this issue will determine whether current help will plug the hole for good, or only temporarily, to make a larger one in the future. The challenge for central banks is to find the right balance between preserving current stability and imposing discipline for the future. Bagehot's doctrine is still a reference today.

The financial crisis: why it may last

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The subprime crisis was first characterized as a liquidity crisis, but a month and billions of dollars of liquidity injections later, the situation has not improved. Perhaps it was not about liquidity, after all.

Since the month of August, economists have been trying to understand why something that was supposed to be positive for global growth, namely the diversification of risk through securitization, has turned out to be the source of the recent crisis. The first reaction was to characterize this as a liquidity crisis: some banks were having undue difficulties in securing funds in the interbank market, and thus central banks reacted by providing liquidity through open-market operations. Many central bankers and academics started smiling with an 'I told you so, there was so much excess liquidity, this was bound to happen', and adopted a tough anti-moral hazard stance. More than a month, and many billions of dollars of extra liquidity injections, later, the situation in money and credit markets has not improved. Central banks have added liquidity to a situation of already excess liquidity to tackle an apparent liquidity crunch, and yet nothing has got better. Perhaps it was not about liquidity, after all.

What we are experiencing is a combination of reduction in the value of global collateral, deleveraging, reintermediation, and risk aversion. Let us explain these four items in turn.

The expansion of the US housing market followed the standard stages of a bubble: an initial surge based on some fundamental factors, such as low interest rates, immigration and an increased desire to invest in housing as a store of value. Technological improvements in mortgage markets, such as better assessment and management of risks due to massive computing improvements, facilitated this expansion. After a few years, the expansion took a life of its own, speculation increased and both activity and prices deviated heavily from fundamentals. The last stages become a bubble, with the phenomenon of subprime credit at the heart of the final acceleration. Many of the mortgages underpinning this housing expansion were resold. They were securitized, meaning a loan would become a tradable asset, and packaged, meaning many loans were put together to form a single asset. The resulting bundles, called credit derivatives, were then sold worldwide, most of them with high AAA ratings because the large number of loans that they included meant a very small risk on any single one of them. This was a smart

idea, as long as many of these individual loans would not sour together. Which is exactly what happened – and was foreseen to happen – when the whole US housing market started to slow down. Delinquencies started to rise and the value of many of these derivatives, especially those packaging the later vintages of subprime mortgages, had to be revised down. As a result, the holdings of assets of many financial market participants worldwide were marked down in value, and their value as collateral declined along the way.

Many of these assets were held by banks. It was a seemingly easy way to bolster profitability, holding AAA-rated assets that yielded more than government bonds and could be sold or used as collateral in money markets. In order to further enhance profitability, many of these assets were held by banks off balance sheet, so as to lower the capital cost of holding risky assets, in innovative forms (now well-known as conduits and vehicles). The result was that banks were holding more risky assets for a given level of capital. When the value of these assets had to be marked down and the conduits brought into the balance sheets, the prudential ratios were not met any more and banks had to sell some of these assets, whose prices declined. With deteriorated balance sheets, banks had to cut down on loans.

The unexpected increase in delinquencies induced many market participants to think, all of a sudden, that the ratings of many of these instruments were suspect and that all banks in many countries were potentially at risk. As a result, risk aversion and volatility increased and the demand for risky assets declined. Finally, the reduced demand for risky assets led to banks being less able to sell their loans and mortgages, and thus to have to keep them in their balance sheets. The result is substantial reintermediation of credit, the outdoing of securitization, with three consequences: first, banks may run into regulatory limits as their balance sheet suddenly changes; second, banks need more cash to service all these new commitments and they become reluctant to lend just in case further surprises appear; third, banks become reluctant to lend to other banks because counterparty risk, the possibility that a fellow bank might be unable to pay back a loan, has increased. Instead of lending cash to each other as they normally do, banks hoard cash and liquidity dries up. As central banks inject liquidity, banks just accumulate more and more. The system is in a liquidity trap.

What is the right response from a risk management standpoint to a sudden increase in balance-sheet risk, volatility and uncertainty? Reduce positions dramatically – which in the case of banks implies curtailing lending – and, very slowly, start to rebuild leverage only when both uncertainty and volatility decline and the capital base has been restored. In other words, credit growth and the demand for risky assets are likely to decline for an extended period of time.

What are the implications for policy of this episode? First, this crisis was not the result of interest rates being too low. For any given risk-free rate, banks can always choose which level of risk to take on board, and it is now clear that banks chose, in some countries, to hold a lot of risk. The way to stop this process would have been tighter supervisory control, not higher interest rates. In fact the problem has occurred in countries with very different monetary policy approaches to asset prices and different monetary policy stances. The phenomenon of subprime mortgages was the result of weak underwriting standards and excess demand for the asset class, not of low interest rates. Whether these exposures were on- or off-balance sheet is a critical determinant of where the surprises are. This shows that monetary

policy should deal with two objectives, price stability and financial stability, but we know that tackling two objectives with one instrument is not an efficient arrangement. Monetary policy should ensure price stability, supervision should ensure that risk management is appropriate and both should work together. Spain, a country with one of the most overvalued house markets by some metrics and one of the loosest monetary-policy stances (it has enjoyed negative real interest rates for many years now), has little or no subprime problems and its financial sector has not engaged, as far as is known, in the risk accumulation process that is at the heart of the current crisis. It probably had the right macro-prudential settings.

Second, the right monetary policy response to a sharp decline in the demand of risky assets may not be a liquidity injection, but a reduction in the price of risky assets that offsets, at least in part, the decline in its demand. Liquidity injections are trying to address the symptoms, not the underlying malaise, which can be summarized in an increase in the cost of capital as reintermediation becomes widespread. Central banks must assess whether the increase in the cost of capital needs to be offset in order to maintain price stability, and cut rates if needed.

Third, moral hazard is better dealt with during the upside than the downside. It is clear that, from a political standpoint and especially if the asset is housing, it is very difficult to adopt policies opposed to moral hazard when asset prices are spiralling downwards – and even more if the poorer classes of the population are affected, as it is the case with the subprime problem in the United States. It is also clear that in today's integrated capital markets, the system is more resilient to small shocks but more fragile when faced with big shocks, and thus considerations of 'too big or too many to fail' [[not sure what this means]] soon arise. And experience shows that, in general, moral hazard becomes secondary when the stakes are high. Two examples come to mind. The first one is the Asian crisis in 1997. At the time, the theory was that bank-deposit guarantees should always be limited to avoid moral hazard. The IMF went to Indonesia and announced the closure of several banks, and a bank run ensued. From that moment, the orthodoxy changed: first declare a blanket deposit guarantee, then announce a bank restructuring process. One wonders why this lesson was not applied in the Northern Rock case in the United Kingdom. The second example is the saga of the Stability and Growth Pact (SGP) in Europe. The attempts to implement the programme of sanctions during a growth slowdown were highly criticized and, at the end, some forbearance was applied and the SGP was reformed by strengthening its preemptive arm: to deal with moral hazard during good times. The same applies to the financial sector: supervision and regulation have to work towards systems that control more effectively building up banks' leverage during good times.

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Fallout from the credit crunch

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Economists cannot say: 'We told you so.' Economists do not have perfect foresight. But like doctors after the outbreak of a contagious disease, economists can tell you how the disease might spread, so that you may be better prepared. Here are some of the possible dangers ahead.

For years economists and policy-makers have worried about the fragility of the US economy, and particularly about the unsustainability of the US housing boom, but when the shock finally occurred, everyone – central banks, commercial banks, hedge funds, private investors - appears to have been unprepared. The big surprise was the nature of the shock. Suddenly banks stopped lending to one another, except on punitive terms. Liquidity dried up, threatening the existence of otherwise well-functioning banks and businesses. The crisis of confidence jumped across US borders with ease, as the recent run on Northern Rock has shown. How will this financial turbulence affect the world economy?

Economists obviously do not have perfect foresight; so I will not try to anticipate the future. But economists can do what doctors do after the outbreak of a contagious disease. They can tell you how the disease might spread, so that you are prepared. This is my purpose: not to make a forecast, but to warn of possible dangers.

Expectations inertia

Investors tend to imagine that the world will continue to be approximately like it is now. Before the US Federal Reserve reduced the benchmark interest rate by one-half a percentage point on Tuesday 18 September, financial markets were in despair; afterwards they were euphoric. Such myopia is dangerous. So far, economic activity – production, employment, consumption, investment and trade – has remained largely unaffected by the credit crunch. Many seem to believe this will continue. Equally dangerous.

If the credit crunch persists, there can be no doubt that economic activity will suffer. The Fed's interest rate cut will not prevent US home foreclosures, nor will it eliminate the glut of unsold homes. If US house prices continue to fall and unemployment continues to rise, consumers will doubtlessly reduce their spend-

ing, and the fall in demand will aggravate the rise in unemployment, hurt the US stock market and thus lead to a further fall in spending.

Meanwhile, it is worth keeping in mind that the United States is not the only country where house prices have risen much faster, on average, than national incomes. On the contrary, house prices in Australia, Denmark, France, Ireland, Spain, Sweden and the United Kingdom have all increased faster, over the past ten years, than in the United States. Of course the United States is a special case on account of its subprime mortgage lending towards the end of its housing boom. There, mortgage lenders with poor credit records could buy houses virtually interest-free for a few years, before the rates were adjusted steeply upwards. But the danger of international contagion remains. The US housing slump may well lead investors in Europe to reassess the value of their properties. If that happens, then consumption spending is likely to fall in the countries listed above, leading to weaker labour markets.

This could happen at a time when the Chinese economy has overheated and will need to slow down, and when the Japanese economy is stagnating. There are no other countries to take up the slack, to serve as a motor for the world economy as the United States has done for so long.

Germany

In short, a recession in the United States is possible and this recession could spread to other countries, primarily through loss of confidence within financial markets and house price contagion. Germany, needless to say, need not worry about a housing slump, since its housing market has already been in a state of slump for over a decade. But that does not mean that Germany is immune from the dangers of the current financial turbulence. The German economy is heavily dependent on its exports, and these would clearly suffer if world economic activity declined. Furthermore, as we have seen, the fallout from the US credit crunch can affect the balance sheets of German banks.

Of course these dangers may not materialize, just as contagious diseases need not spread. It is useful, however, to know where the dangers lie.

Even if times ahead are troubled, the long run is likely to look much more settled. In the short run, a housing slump could well make private investors and central banks outside the United States less eager to hold dollars. A survey by the US Treasury Department last year indicates that about one-third of foreign-held US corporate debt consisted of asset-backed securities and about half of that was mortgage-related. Petrodollars held in the Middle East and Russia are particularly mobile. If foreign money leaves the United States, the dollar would fall. In the longer run, US exports would rise, shrinking the huge US trade deficit. Moreover, a recession in the United States would lead to lower imports, further reducing the trade deficit. At the same time, China may well let the yuan rise against the dollar, leading to a rise in its domestic spending relative to its exports. Once US consumers spend less and Chinese consumers spend more, the large global imbalances, which have cast a shadow on the world economy for the past decade, would begin to disappear.

Four mega-dangers international financial markets face

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30 April 2008

The financial turmoil has been worsening as lagged adjustment processes play out. This article outlines economic dangers that may arise as they unwind, including a scenario in which the United States suffers extended stagflation.

Day after day new, alarming news emerges from the world's financial markets, and day after day the public is surprised by how bad it is. But instead of wringing our hands, let us ask ourselves an important, unconventional question: What is more surprising: that financial markets have turned from bad to worse, or that we continue to be surprised by each successive piece of adverse news?

I suggest that our repeated surprise should be more surprising. This issue is important, because if we were better at recognizing the financial risks we face, we could do more to avoid them. If banks, investment houses and American homeowners had done a better job in recognizing the risks in the subprime mortgage market, we could have spared ourselves the current crisis.

Why does the public repeatedly underestimate the repercussions of the present financial crisis? The answer is simple: most of us are short-sighted; we cannot imagine a future that is radically different from the present. In particular, most of us do not understand that economic events often unfold gradually due to the operation of important lagged adjustment processes embedded in the economy. The public, the media and politicians would do well to give these lagged adjustment processes close attention. After the Titanic's hull was punctured, it took hours for its hull to fill with water; thus the passengers could not imagine that it would sink.

In my judgement, there are currently four major dangers facing the world economy, and all of them are obscured by the fact they play themselves out slowly.

Four dangers

The first danger we have witnessed since August 2007. The subprime mortgage crisis gave rise to a liquidity crisis in the international banking system, due to uncertainty about who holds the losses. This is leading to reduced lending to firms and households. But that is not the end of the story, because the reduced lending will lead to reduced consumption and investment. With a lag, reduced sales of

goods and services will reduce stockmarket valuations. And, with another lag, the lower stockmarket prices will – in the absence of any favourable fortuitous events – intensify the banks' liquidity crisis.

The second danger lies in the dynamics of US house prices. As more and more US households find themselves unable to repay their mortgages, foreclosures are on the rise, more houses are put on the market, the price of houses falls further, with further lags, which leads to more foreclosures and declines in housing wealth. This dynamic process plays itself out only gradually, as households face progressively more stringent credit conditions and house sales prices gradually become lower.

The third danger results from the interaction between wealth, spending and employment. As US households' wealth in the housing market and the stockmarket falls, their consumption begins to fall and will continue to do so, again with a lag. This decline in consumption is leading to a decline in profits, of which more is on the way, which in turn will lead to a decline in investment. The combined decline in consumption and investment spending will eventually lead to a decline in employment, as firms begin to recognize that their labour is insufficiently utilized. The decline in employment, in turn, means a drop in labour income, which, with a lag, leads to a further drop in consumption.

And that leaves the fourth (and possibly the nastiest) of the dangers, one that concerns the latitude for monetary policy intervention. As the Fed reduces interest rates to combat the crisis, the dollar is falling. This is leading to higher import prices and oil prices in the United States, putting an upward pressure on inflation. The greater this inflationary pressure – which is currently in excess of 4% – the more difficult it will be for the Fed to reduce interest rates in the future, without running a serious risk of inflaming inflationary expectations and starting a wage-price spiral. US firms and households will gradually recognize this dilemma and the bleak prospect of little future interest rate relief will further dampen consumption and investment spending.

Eventually, of course, the decline in spending will lead to a decline in inflation, but this will only happen with a lag. The longer the lag turns out to be, the longer the period over which the US economy will endure stagflation, that is, a cruel combination of rising prices and falling aggregate demand. Much hinges on how persistent US inflation is. More persistent inflation will inevitably give rise to higher inflationary expectations, leading gradually to higher inflation and so on. It took central banks over a decade, in the 1980s and early 1990s, to get inflationary expectations under control, and the fruits of this battle are now in danger of being lost.

Global implications

The international financial crisis and the decline in the US economy will inevitably have an adverse effect on the growth of the world economy. Europe and the emerging markets of Latin America and the Far East cannot fill the gap that the US economy leaves. There exists no economic mechanism whereby a drop in the US aggregate demand will be matched by a correspondingly large increase in aggregate demand elsewhere. Germany and other European economies highly exposed to the vagaries of international trade will certainly feel the pinch.

In the longer run, the prospects for the world economy look much brighter. Eventually US house prices will stabilize, rising exports will help the US economy recover, the fall in world demand for goods and services will reduce the price of raw materials, US households will learn the importance of saving and global imbalances will correct themselves. These rosy prospects lie in the mists of the future. Meanwhile, however, we are well advised to stay focused on the four dangers.

Federal Reserve policy responses to the crisis of 2007–8: a summary

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The nature of the ongoing financial turmoil that began in August 2007 has rendered traditional monetary policy responses ineffective. This article summarizes the US Federal Reserve's response to the crisis.

Central bankers are conservative people. They take great care in implementing policy; they speak precisely; they explain changes completely; and they study the environment, trying to pinpoint where the next disaster looms. Good monetary policy is marked by its predictability, but when the world changes, policy-makers change with it. If a crisis hits and the tools at hand are not up to the job, then central-bank officials can and will improvise. In August 2007, the world changed and the traditional instruments of monetary policy were not up to the task.

For some time now, there has been a consensus among monetary economists on the fundamentals of policy design. These agreed principles of best practice extend from central-bank design to operational policy: central banks should be independent but have clearly defined policy objectives for which they are held accountable; the policy-makers' operational instrument should be an interest rate; and officials need to be transparent and clear in communicating what they are doing and why they are doing it. Furthermore, there is agreement that the central bank is the right institution to monitor and protect the stability of the financial system as a whole.

An important part of the consensus has been that central banks should provide short-term liquidity to solvent financial institutions that are in need. But, as events in 2007 and 2008 have shown, not all liquidity is created equal. And critically, the consensus model used by monetary economists to understand central-bank policy offers no immediate way to organize thinking about this sort of problem.

The crisis

By the beginning of 2007, the stage was set for a crisis. Prices of homes in the United States were at unprecedented levels and borrowing by the owners (as a fraction of the inflation-adjusted value) was higher than ever before. The quality of newly originated mortgages was declining substantially. And, most importantly,

the securitization of these mortgages – where they were put into large pools that formed the collateral for what are known as mortgage-backed securities – had spread well beyond the government-sponsored enterprises (Fannie Mae and Freddie Mac) that traditionally engaged in this task.

On 9 August 2007, the crisis hit and central banks swung into action, supplying large quantities of reserves in response to stresses in the interbank lending market. The spread on 3-month versus overnight interbank loans exploded. And, as problems worsened into the winter, the spread between US government agency securities – those issued by Fannie Mae, Freddie Mac and the like – and US Treasury securities of equivalent maturity rose as well. Investors shunned anything but US Treasury securities themselves.

As the crisis deepened, it became painfully clear that traditional central-bank tools were of limited use. Reductions in the target federal funds rate, the objective of Federal Reserve policy in normal times, had little impact on interbank lending markets. And while the purchase of securities through open-market operations enabled policy-makers to inject liquidity into the financial system, they could not ensure that it went to the institutions that needed it most.

The policy response

In response to intensifying financial-sector problems, Fed officials created new lending procedures in the form of the term auction facility (TAF) and the primary dealer credit facility (PDCF), and changed their securities lending programme, creating the term securities lending facility (TSLF). The TAF offers commercial banks funds through an anonymous auction facility that seeks to eliminate the stigma attached to normal discount borrowing. The PDCF extends lending rights from commercial banks to investment banks (technically to the 19 primary dealers with whom the Fed does its daily open-market operations). And the TSLF allows investment banks to borrow Treasury bills, notes and bonds using mortgage-backed securities as collateral. All of these programmes offered funding for terms of roughly one month at relatively favourable interest rates.

Beyond creating these new facilities, the Fed made adjustments to existing procedures. First, it extended the term of its normally temporary repurchase agreements to 28 days and accepted mortgage-backed securities rather than the normal Treasury securities. Second, the Fed extended swap lines to the ECB and the Swiss National Bank that allowed them to offer dollars to commercial banks in their currency areas. And third, they provided a loan that allowed an investment bank, Bear Stearns, to remain in operation and then be taken over by JP Morgan Chase.

These new programmes are very different from the ones that had been in place prior to the crisis. To understand the difference, it is important to realize that a central bank's contact with the financial system is through its balance sheet, and there are two general principles associated with managing these assets and liabilities. First, policy-makers control the size of their balance sheet, that is, the quantity of what is commonly known as the monetary base. By changing the level of the monetary base (really commercial-bank reserve deposits at the central bank), Fed officials keep the market-determined federal funds rate near their target.

Second, the central bank controls the composition of the assets it holds. Given the quantity of assets it owns, the Fed can decide whether it wants to hold Treasury securities, foreign-exchange reserves, or a variety of other things. Each of the new programmes implemented by the Fed involved changes in the assets the Fed holds. And in nearly every case, officials provided either reserves (cash) or Treasury securities in exchange for low-quality collateral. By the end of March 2008, the Fed had committed more than half of its nearly \$1 trillion balance sheet to these new programmes:

- \$100 billion to the TAF
- \$100 billion to 28-day repo of mortgage-backed securities
- \$200 billion to the TSLF
- \$36 billion to foreign-exchange swaps
- \$29 billion to a loan to support the sale of Bear Stearns
- \$30 billion so far to the PDCF

Changes in the composition of central-bank assets are intended to influence the relative price a financial assets, that is, interest rate spreads. So, by changing its lending procedures, Fed officials hoped that they would be able to reduce the cost of 3-month interbank loans and the spread between US agency securities and the equivalent maturity Treasury rate. At this writing, these programmes have met with only modest success.

While the ECB ponders, the Fed moves – and cleverly at that

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The Fed move, to cut the discount rate while keeping the federal funds rate unchanged, is both innovative and shrewd. It allows banks to liquefy discredited mortgage assets at low cost while leaving open the decision on monetary policy. It also leaves in the Fed's hands the more powerful tool of cutting the federal funds rate if its action does not succeed in quieting market fears.

The Fed has moved smartly and ahead of the crowd. While markets and analysts have debated whether the Fed, the ECB and the Bank of Japan should change their policy orientation, the Fed has invented a new response: lower interest-rate costs while keeping the policy stance unchanged.

What did the Fed do? The Fed provides liquidity to the banking system mostly through its regular sales on the open market. These sales, in effect renewable very short-term loans, are designed to keep the open-market rate – the so-called federal funds rate – at the Fed's pre-announced target level. The Fed did not change this target level, so it remains at 5.25%, just where it has been for more than a year. The federal funds rate, however, is not the only game in town. While the open market is where normally banks and other eligible financial institutions go to find the cash they need, or to download temporarily excess cash, the Fed stands ready to lend cash on an emergency basis through its discount window. The rate at which it does this emergency lending is called the discount rate.

To make sure that the discount window is not used to bypass the open market, the interest rate charged at the discount window is higher than the open-market federal funds rates, normally by a full percentage point. Also, the list of collateral assets that must be deposited with the Fed as a guarantee is more restrictive than those commonly required in the open market.

On 17 August, the Fed lowered the discount rate from 6.25% to 5.75%. But it did not change its target for the federal funds rate; that remained at 5.25%. In essence, it made recourse to the emergency-lending discount window less expensive without changing its target for what the market interest rate should be. It also announced that it would accept as collateral a wider range of assets, including the troubled mortgages, and that it would lend for longer periods, up to 30 days.

What is smart about this is that the Fed has in one stroke relieved pressure on the credit market without changing the federal funds rate and, simultaneously,

has kept its options open for its next decision due 18 September. The Fed has had its cake and eaten it too.

The thing to fear is fear itself

Whether the current crisis is a temporary hiccup or the beginning of a serious financial meltdown remains very much an open question. In my recent Vox column 'Subprime crisis: observations on the emerging debate', I argue that the subprime crisis is perfectly digestible without wider trouble, but that panicky market reactions could well drive financial markets down worldwide. We are now in one of these delicate moments when potentially irrational market expectations drive outcomes, which then make expectations look rational ex-post. Breaking this vicious circle is a necessary step in stopping the stampede. Only central banks can do this; the Fed is first in line to do so.

The Fed, however, faces a delicate balancing act. It has been worried about a resurgence of inflation and this is why it has kept the federal funds rate at 5.25% (a rather high level) for more than a year. Before the crisis picked up speed, it obviously intended to wait and see before embarking on a path of declining rates. Most observers thought that this caution made a lot of sense. If the crisis now subsides, such a stance still makes sense. This is why the Fed does not want to rush in and cut the federal funds target rate. But if the crisis persists and/or deepens, the Fed can shift its concerns away from inflation and towards a possible recession. It is of the essence, then, still to wait and see.

It is also essential to do everything that is humanly possible to significantly reduce the very real possibility that the crisis deepens. By reducing the discount rate and accepting the infamous mortgage-linked assets as collateral, the Fed is offering markets a very strong reassurance. They can now find cash, and use the hot potato as collateral, in virtually unlimited amounts, at a cost, of course, but a very moderate one. The odds of a meltdown have now decreased.

The ECB's next move

Attention will now move to the ECB. The debate on whether the ECB should give up its long-held plan to raise its interest rate at its 6 September meeting is swelling. Some argue that changing its mind would be a loss of face, a very silly view since the situation has radically changed, but silliness is part of life. Others call for a pause before the next step – basically a wait-and-see stance. Yet others want to see the ECB completely reverse tack and lower the interest rate to deal with the crisis. For the ECB, too, this is a catch-22 situation. An innovative reaction is required. It might be difficult to do better than follow what the Fed did today.

Central-bank legend has it that governors earn – or destroy – their reputations in times of crisis. For months, Fed watchers had tried to gauge Bernanke. All they had to chew upon was what he was saying and not saying, not what he was doing because there was nothing particularly challenging in his actions. The elegant solution just adopted will undoubtedly kickstart the Bernankemania that was becoming overdue and dispel the long shadow of the maestro, his larger-than-life predecessor. A good omen for these troubled times.

Section 3

What Can Be Done?

The subprime crisis: who pays and what needs fixing

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19 August 2007

The market participants who profited from creating the faltering debt instruments are not the ones who will pay most of the cost of the crisis; the losses will fall on the shoulders of final investors. Three things need fixing: credit ratings, evaluations of asset marketability and transparency in the retail market for financial assets.

The rollercoaster swings of the financial markets that have been sending shivers down the investors' spines since February are much more than the unavoidable correction after a five-year bull period.

The Economist wrote that this is a good time for a credit squeeze and praised the benefits of tighter conditions, following the conventional wisdom that downfalls are helpful because they lead to a more correct pricing of goods and financial assets. There is, however, a peculiar feature of the last crises (and particularly of this one) that makes this position less acceptable, at least from the point of view of who bears the losses and who pocketed the gains during the boom.

There are four characteristics of the present financial system that are worth remembering.

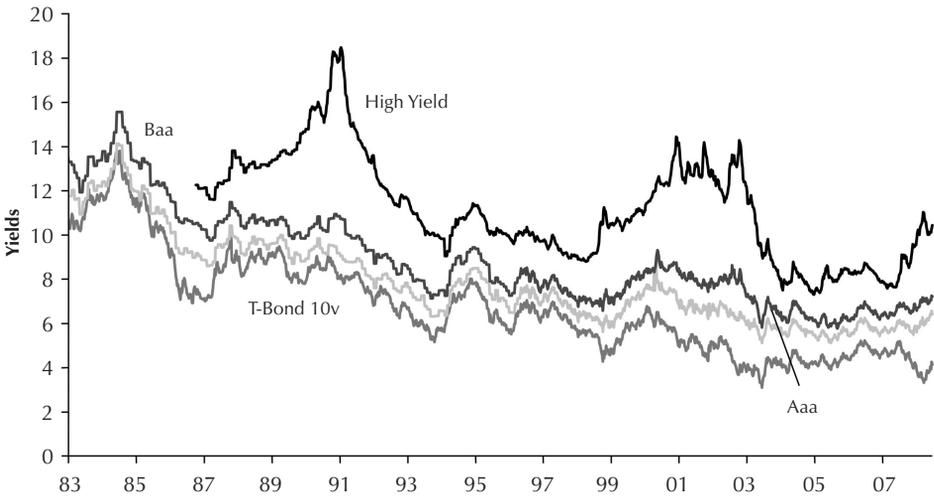
The dramatic rise of financial assets and derivatives all over the world. At the end of 2005 (IMF, Global Financial Stability Report, April 2007, total financial assets stood at an astonishing level of 3.7 times world GDP. The notional amount of total derivatives was double than the volume of total financial assets, which means 11 times global GDP. Remember that financial derivatives did not exist only 30 years ago.

The historical low level of interest rates over the last years, since the mid-1990s (as an effect of Greenspan's monetary policy and his attempt to feed the growth of the stockmarket). As a consequence of favourable monetary conditions, the price for risk required by the market also stood at very low levels. Figures 1 and 2 give clear evidence of the abnormal situation prevailing in the last years.

The growing weight of stocks and bonds as a percentage of total financial assets (therefore the decrease of loans by banks and other financial intermediaries). At the world level (and in the EU), bank loans account for 50% of total financial assets, but in the United States and Japan the ratio is much lower. In the United States, only \$1 dollar out of \$5 is borrowed from a bank.

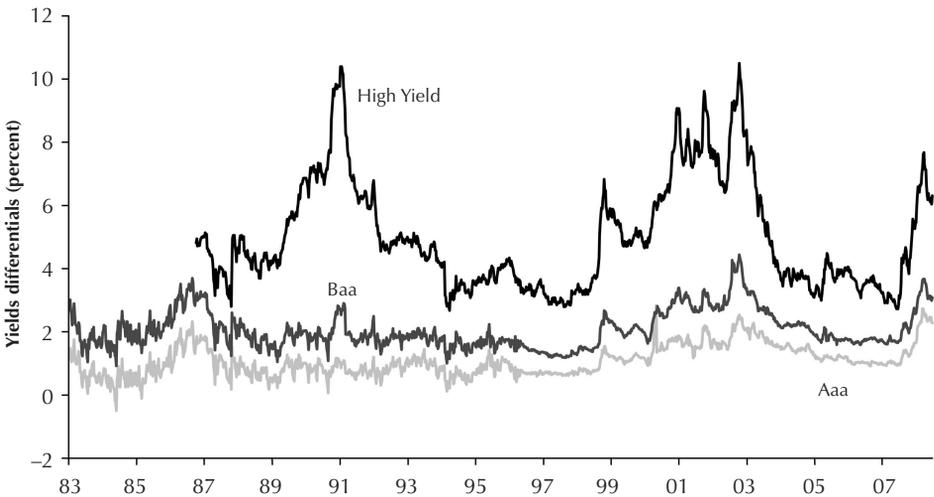
The decrease of government bonds (i.e. risk-free assets) on total debt securities. While the average ratio at the world level is 50%, in Europe it is 35% and in

Figure 1 USA: Yields on corporate and treasury bonds



Source: Thomson Reuters, Lehman Brothers, Merrill Lynch.

Figure 2 USA: Yield differentials with 10-year US treasury bonds



Source: Thomson Reuters, Lehman Brothers, Merrill Lynch.

North America 26%, with a downward trend. The last two points mean that households' portfolios are more and more made of securities bearing both market and credit risk.

These are the ingredients of the magic of financial innovation of the last decades: in a nutshell, banks created an astonishing volume of debt, packaged it into various kinds of securities, with different degrees of guarantees. These securities have been purchased by a wide range of smaller banks, pension funds, insurance companies, hedge funds, other funds and even individuals, who have been encour-

aged to invest by the generally high ratings given to these instruments. According to an important school of thought, this arm's-length financing is the most efficient way to allocate resources. Others can recall Charles Dickens, who defined credit as a system 'whereby a person who cannot pay gets another person who cannot pay to guarantee that he can pay'.

As a matter of fact, the global financial systems proved to be very resilient to real and financial shocks in the last two decades, but what mostly worries central banks is that, unlike in the old bank-based times, they simply do not know where the risk is. Witness this statement in the June 2007 Report of the Bank for International Settlements (p. 145): 'Assuming that the big banks have managed to distribute more widely the risks inherent in the loans they have made, who now holds these risks, and can they manage them adequately? The honest answer is that we do not know.' Honest, but frightening.

The only thing we know is that the losses will fall on the shoulders of final investors, and will not be shared with banks, as happened in more intermediated forms of finance. The point is that banks' profits in the last 20 years have stood at historical high levels. Returns on equity have been normally at two-digit levels (the first being preferably two) and probably will only be dented by the forthcoming market correction. In other words, the credit madness is over, a diet was overdue, but those that will have to follow a rigid diet are not those who put on weight in the past years. The allocative efficiency of the arm's-length financing deserves at least a second judgement.

The policy implications of what is under our eyes are at least threefold.

First, once again, a rating problem has emerged. Credit-risk assessments have been made on too optimistic assumptions, using data not always statistically significant and systematically ignoring tail events. When banks do not take risks on their books, but only sell them, the fragmentation of responsibilities leads to what *The Economist* has defined as 'too much money [being] lent too cheaply and too easily to too many people'. Banks should not skip risks so easily: a portion of the risk (e.g. using capital requirements) should remain on banks' balance sheets.

Second, the securities issued were much less marketable than banks pretended. Most sophisticated bonds were infrequently traded; some were tailored by investment banks for specific clients and were never traded. Mark-to-market was therefore only a subjective valuation involving complex computer models and assumptions, both directly made by the investment bank itself. The much vaunted 'price discovery' by the market, the very heart of a securitized world, was simply an illusion. Final investors are barely protected when their securities are traded in such over-the-counter (unregulated) thin markets.

Third, there is a problem of transparency in the retail market for financial assets. As financial products are becoming more and more sophisticated, a great majority of investors are not aware of the risks that they are actually taking. There are two hypocritical reactions that are emerging: to ask for more disclosure and/or for more financial literacy. The first one should lead only to an increase of sophisticated prospectuses, which can be read only by those holding a PhD in finance (possibly of a very recent vintage). The second one is even more absurd (not surprisingly immediately backed by President Bush), as it is simply impossible to fill the gap between the current level of financial education and the level of rocket-science finance involved in current financial products. The only solution is to use

regulation (and particularly the conduct of business rules) to make it more convenient for retailers to sell simple financial products. A wide body of research (particularly in the United Kingdom, sponsored by the Treasury and the FSA, the financial supervisor) proves that the present regulatory philosophy creates a strong bias towards sophistication and opacity. Time has come to change course and to create incentives for financial intermediaries to sell easier products to the final investors. Only at that point will a higher level of financial education be effective. Time has also come for finance economists to look more closely and in a more Dickensian way at what happens at the last step of the magic of credit creation.

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Filling the information gap

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The Basel Committee on Banking Supervision and the Basel II framework were intended to mitigate or prevent crises like the subprime mess. The valuation practices and market transparency recommended by the committee fall short of what is needed.

The midsummer blues are not quite over yet: with subprime default rates still on the rise, 3-month interbank rates stay abnormally high, credit conditions remain tight, gross issues of mortgage-backed bonds and commercial paper are all but dried up, and banks lick their wounds and attempt to set up emergency vehicles to dispose of the backlog of illiquid assets left in their books. The system remains vulnerable. Still, as the worst fears for financial stability have subsided, the debate now shifts from the central banks' ex-post emergency reactions to the preventative reforms needed for the future. Unfortunately, given the nature of this crisis, there is no quick fix this time.

The textbook paradigm

In its unfolding, this crisis conforms to the textbook paradigm. In a financial system where intermediaries hold illiquid assets against liquid liabilities, there are two possible equilibria. When only those agents subject to liquidity shocks require the service from intermediaries, the latter are able to carry out maturity transformation and allow society to earn superior returns. When instead, as a result of a shock, all agents, simultaneously but independently, seek liquidity, the intermediaries' balance sheets go under stress, there is no demand for less liquid assets and disruptive liquidations may threaten financial stability: a succinct description of what has happened between July and September.

As noted by Mervyn King,¹ the 'most unusual nature' of this crisis was the disproportion between the shock ('a relatively small size of ... bad loans compared with the total assets of the banks') and its widespread systemic consequences. Echoing King, Bernanke wondered how the impact could be so large, comparing the US subprime mortgage market with 'the enormous scale of global financial

1 Speech at the Northern Ireland Chamber of Commerce and Industry, Belfast, 9 October 2007.

markets'.² True, also in the textbook model, crisis equilibria may be triggered by potentially insignificant events. But according to the textbook prescriptions, undesirable outcomes can be avoided through informed supervisory action: supervisors possessing the relevant information on potential exposures to shocks are better able to prevent a crisis, thereby reassuring all market participants that threats to financial instabilities can be contained. When, on the other hand, market participants not only do not know how serious and widespread the impact of a dislocation is, but also become aware that the supervisory authorities are no less ignorant, they rationally cut their risk positions by more than would be warranted if they possessed greater information and could rely on the presence of a better-informed coordinating agent. The surge in volatility and the drying-up of liquidity make the worst scenario self-fulfilling.

This is, in our view, what has happened this time. A generalized lack of information multiplied the effects of the initial shock.

The information gap

The information gap was wide and deep. Mortgage brokers had an incentive to provide the raw material by quantity, regardless of quality. The valuation of the structured and complicated financial instruments pooling credit risks rested on rating agencies' models, biased by observations limited to a relatively short span of very benign history. Those products were issued and (rarely) traded over the counter: marked to model, as there was no proper market assessing their liquidity. By the very nature of the CRT (Credit Risk Transfer), nobody had a clue where the credit risks had ended up.

This would have mattered less if the ultimate risk recipients had been only the usual suspects: hedge funds, pension funds, and insurance and reinsurance companies. The systemic consequences of the collapse of a few of those would be confined to the counterparty risks assumed by some intermediaries in their lending or broker-dealer activities. But it turned out that there were many banks among those more heavily exposed to the direct risk of credit products, through off-balance sheet liquidity commitments granted to vehicles investing in those illiquid assets, equity tranches in the CDOs, own portfolio investment and reputational commitment to proprietary mutual funds engaged in ABSs. The authorities in charge of stability supervision were seemingly unaware of this exposure: certainly they appeared to be caught by surprise by the consequences of the subprime insolvencies on the banking system, ignorant of where the losses were located and therefore unable to deal selectively with the problem. The consequence was widespread mutual mistrust causing the hoarding of banks' liquidity and the hike of interbank rates.

Filling the multidimensional information gap that was responsible for transforming a spate of subprime defaults into a fully-fledged crisis should be a priority of any reform effort. Unlike in earlier crises, however, there are no obvious solutions to this

2 'The Recent Financial Turmoil and its Economic and Policy Consequences', Economic Club of New York, 15 October 2007.

problem. We confine ourselves to drawing a list, in order of importance, of what we believe to be the more relevant issues.

Filling some gaps

At the origin there is a purely American problem: a crowd of unlicensed non-bank brokers, governed by wrong incentives, offering mortgage loans to all and sundry, irrespective of any assessment of the debtor's potential solvency. Though the party is over by now, the problem remains and will have to be addressed by Congress.

Next, when credit risks are pooled and repackaged, comes the role of the rating agencies whose decisions affect the allocation of risks in different investors' portfolios. Apart from their conflicts of interest from their semi-monopolistic, officially sanctioned status,³ a major information problem arises from the suitability of the statistical models used to provide the ratings on which many investors rely blindly. The spate of downgradings affecting them in recent months is evidence of serious flaws. Some propose that the rating agencies should be treated as underwriters, with the attendant responsibilities; at the very least their models should be subjected to an independent inquiry and, as it were, be themselves rated.⁴

A deep and wide secondary market ensuring at least post-trade transparency is an essential provider of information; over-the-counter transactions instead remain opaque and known only to the parties concerned. The heterogeneity of structured products (each with idiosyncratic features) is an obstacle to the supply of a public good. An agreement prompted by industry associations in consultation with the supervisors to standardize the most diffuse classes of instruments, as was done for some derivative contracts, would be a step towards the creation of a market.

There is then the question of the bank-sponsored investment vehicles (SIVs) and of the treatment of the liquidity facilities provided to them by banks, which under Basel I are exempt from capital requirements (and hence from disclosure) as long as the commitment is for less than 365 days. The somewhat more stringent prescriptions of Basel II are still short of achieving adequate transparency. This, however, is only a part of a more general issue: that of designing an efficient structure of information flows in order to fill those gaps prejudice stability.

A wider problem: Basel II?

Ideally the authorities in charge of stability should be empowered to acquire all the information needed to assess the system's (and not only an individual agent's) vulnerabilities from all financial entities whose actions may have systemic effects. They would thus be better equipped to prevent the eruption of dislocations as well

3 On the role and the shortcomings of ratings agencies see J. R. Mason and J. Rossner (2007), 'Where Did the Risk Go? How Misapplied Bond Ratings Cause Mortgage Backed Securities and Collateralized Debt Obligation Market Disruptions', mimeo (May).

4 Credit ratings agencies have themselves 'acknowledged the need to review the information they receive from originators and they provide to investors in structured credit products' (Financial Stability Forum, Working Group on Market and Institutional Resilience, 15 October 2007).

as to provide guidance to market participants on the risks present in the system. In the view of the Basel Committee on Banking Supervision, the implementation of the Basel II capital framework, by improving 'the robustness of valuation practices and market transparency for complex and less liquid products', 'would have gone some distance' to alleviate the present crisis. We believe that the distance would have been very short, as the Basel II framework represents only a small approximation to a satisfactory solution.

First, disclosure belongs to the third pillar of the accord (market discipline), which is recognized as by far the weakest, in terms of both prescriptions and enforcement.⁵ Second, Basel II disclosure is required in order to assess an individual bank's capital adequacy. That is not enough: a strong bank capital base, while essential to avoid the collapse of any major financial institution, was not sufficient to prevent the systemic effects of the subprime crisis. Third, any disclosure obligation imposed by the accord only concerns banks. But all the entities having liquidity mismatches between assets and liabilities may produce systemic effects, either directly with counterparties or through the structure of their balance sheets: not only traditional intermediaries, but also broker-dealers, non-thrift financial institutions borrowing wholesale in the market, any kind of vehicle with the same characteristics, as well as hedge funds.

Finally, designing an efficient structure of information flows meets institutional obstacles. In a closely connected financial world, where cross-border entities prevail, information on global stability is the more valuable the less its gathering and processing are fragmented. There are natural limits to this and cooperation between bank supervisors helps. But there are obvious steps to be taken to improve the situation. At the national level, the single regulator model, whereby banking supervision is not a responsibility of the lender of last resort, has shown important flaws, at least in Germany and the United Kingdom. More importantly, similar faults are present in the euro area, where the ECB, which, though not a lender of last resort, is responsible for providing liquidity, has no supervisory competence and must rely on the information voluntarily provided by the national central banks.

Adequate, reliable and timely information is essential to ensure financial stability. Filling the information gap, however, has so far been a slow and hesitant process. Do we need more crises to move forward at a faster pace?

⁵ It has been alleged that Basel II has a 'bias in favour of nondisclosure', strengthened by the opposition of the banks (Institutional Risk Analytics, Comments to the proposals, October 2006).

Lessons from the North Atlantic financial crisis

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What caused the current North Atlantic financial crisis, how can it be fixed and how can the likelihood of future crises be reduced? This article introduces a new CEPR Policy Insight, 'Lessons from the 2007 Financial Crisis', which addresses these issues at length.

The crisis is the product of a perfect storm, bringing together a number of micro-economic and macroeconomic pathologies. Among the microeconomic systemic failures were: wanton securitization, fundamental flaws in the rating agencies' business model, the procyclical behaviour both of leverage in much of the financial system and of the Basel II capital-adequacy requirements, privately rational but socially inefficient disintermediation and competitive international deregulation. Reduced incentives for collecting and disseminating information about counterparty risk were a pervasive feature of the new financial world of securitization and off-balance sheet vehicles, what Paul Tucker, Executive Director, Markets for the Bank of England, has called vehicular finance. So was lack of transparency about who owned what and about who owed what and to whom.

The proximate local drivers of the specific way in which these problems manifested themselves were regulatory and supervisory failures in the US home loan market.

Solutions to the microeconomic pathologies will be partly market-driven, partly imposed by regulators. They include the following nice 'do's':

- Insist on simpler financial structures and products, instead of financial engineering masterpieces that cannot be priced even by their designers, let alone by buyers and sellers in the secondary markets.
- Require the retention of the equity tranche (or first-loss tranche) by the originator of loans, to mitigate the adverse impact of principal-agent chains on the incentive for information-collecting and monitoring of ultimate borrowers.
- Eliminate the quasi-regulatory role of the rating agencies in Basel II.
- Require rating agencies to sell nothing but ratings, to reduce conflict of interest.
- End the payment of individual rating agencies by the individual issuers of securities they rate.

- Subject all off-balance sheet vehicles that act like banks to the same regulatory requirements and fiscal regime as banks (a principles-based 'duck test' for banks).
- Encourage greater international cooperation between regulators.
- Create a single EU-wide regulatory regime for banks, other financial intermediaries and financial markets. Have one European regulator for all European financial institutions and markets in a given class and/or category.
- Have an international crackdown on regulators of convenience and regulatory havens (alongside a long-overdue crackdown on tax havens).

Among the macroeconomic pathologies that contributed to the crisis were, first, excessive global liquidity creation by key central banks and, second, an ex-ante global savings glut, brought about by the entry of a number of high-saving countries (notably China) into the global economy and by the global redistribution of wealth and income towards commodity exporters that also had, at least in the short run, high propensities to save.

The Fed, the ECB and the Bank of England did not exactly cover themselves with glory in addressing the global shutdown of the financial wholesale markets and the continuing crunch and illiquidity in the interbank markets. The ECB probably did best, followed by the Fed, with the Bank of England coming in a well-beaten third.

All three central banks are now injecting fair amounts of liquidity not just in the overnight interbank markets, but also at longer maturities, especially at one and three months. The Bank of England was most reluctant to tackle the very large spreads between, say, 3-month Libor and the market's expectation of the official policy rate over a 3-month horizon (as measured by the fixed leg of the Overnight Indexed Rate Swap or OIS). It believed (against the evidence and the odds) that this reflected largely market perceptions of counterparty default risk, rather than liquidity risk. The Bank also only recently widened its list of eligible collateral in 3-month repos (sale and repurchase operations) to assets beyond the high-grade sovereign-debt instruments it had insisted on before. For the December 2007 and January 2008 auctions it announced, that it also, for the first time, was willing to do repos against this wider range of collateral at market-determined rates, rather than insisting on a penalty floor for the rate, as it did in September.

The ECB immediately threw very large amounts of liquidity at the longer-maturity interbank markets and the Fed pumped in moderate amounts. Interestingly, except in the very short run, the effect on the interbank spread over the OIS rate did not respond very differently for sterling, the euro and the US dollar. Before one concludes from this that open-market operations at these longer maturities have no influence on the spreads, one has to recognize that the need for liquidity may not have been the same in the three interbank markets. For starters, many UK banks with subsidiaries in the eurozone (and some with subsidiaries in the United States) obtained liquidity through these subsidiaries. Other indicators of liquidity of the interbank market, such as the volume of private transactions, suggest that, even with comparable spreads, UK banks continue to face especially tight liquidity conditions.

In the UK, failures of the tripartite financial stability arrangement between the Treasury, the Bank of England and the FSA, weaknesses in the Bank of England's liquidity management, the regulatory failure of the FSA, an inadequate deposit insurance arrangement and deficient insolvency laws for the banking sector all contributed to the financial disarray.

Despite this, it may well be possible to contain the spillovers from the crisis beyond the financial sectors of the industrial countries and the housing sectors of the United States and a few European countries. The reason is that the credit boom that came to an end in 2007 did not give rise to major excesses in physical capital formation (fixed investment), except in the financial sectors just about everywhere and in the residential construction sectors of a few countries, including the United States, Spain, Ireland, the Baltic states and Bulgaria. The saving-investment balances and balance sheets of non-financial corporates remain healthy. The financial imbalances are mainly in the financial sector (excessive leverage, deficient liquidity, insufficient capital and the need for massive write-downs of assets, that is, specialty CDOs and other complex securitized structures) and to a lesser extent in the household sector (financial deficits, excessive mortgage debt, unsecured consumer debt and the need to take large hits on the valuation of key assets, especially residential property). While a slowdown is unavoidable – and, in the case of the United States, necessary and desirable for the restoration of external balance – a recession is not.

Lessons from Northern Rock: banking and shadow banking

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The UK Treasury Committee recently released a report on the lessons from the plight of Northern Rock. In the first of a two-article series, Willem Buiter analyses the shortcomings of the report's recommendations for reducing problems in the banking and shadow banking sectors.

Two highly readable reports on the lessons learnt from the Northern Rock debacle have been published recently. The first is the Treasury Committee Report 'The Run on the Rock' published on 26 January 26. The second is 'Financial Stability and Depositor Protection: Strengthening the Framework', published jointly by HM Treasury, the FSA and the Bank of England on 30 January. The publication of the latter document launches a consultation on the proposals contained in it for domestic and international action to enhance financial stability. The Treasury report covers five areas: first, strengthening the financial system through domestic and international actions; second, reducing the likelihood of banks failing; third, reducing the impact of failing banks; fourth, deposit insurance; and fifth, strengthening the Bank of England and improving the operation of the tripartite arrangement. This article analyses the first two parts.

Strengthening the financial system

There is nothing substantive regarding unilateral or coordinated international action to strengthen the financial system, just some pious platitudes about the need to strengthen risk management by banks and to improve the functioning of securitization markets by beefing up valuation methods and the performance of credit rating agencies. This is a missed opportunity, as the current financial crisis has reminded us that when finance is global and regulation is national, accidents are much more likely to happen. Regulatory arbitrage and competitive deregulation to gain or retain footloose financial businesses within national jurisdictions have been important contributors to the excesses committed by financial institutions and to the mispricing and misallocation of risk by credit markets and other financial markets since (at least) 2003. The proliferation of opaque complex financial instruments traded by opaque off-balance sheet financial vehicles calls for global action. Coordination between multiple institutions, especially in a crisis, is

always problematic: panic moves at the speed of light and even well-intentioned, cooperatively minded parties will find it hard to engage in synchronized swimming while piranhas and sharks lurk at their tender extremities.

The United Kingdom's light-touch regulatory approach has been found wanting and exposed as little more than soft-touch regulation. No doubt it has been successful in attracting financial sector activity to London, that is, it has been an effective competitor in the socially negative-sum global deregulation game. It has made a material contribution to the regulatory race to the bottom, which has left much of the shadow banking sector outside the regulatory net altogether, and has reduced both the information available to the regulator and the power of the regulator to prescribe or proscribe behaviour in those market segments that remain regulated.¹

At the European level, the need for the creation of a single EU regulator for any given market segment, responsible for all financial institutions engaged in significant cross-border activity (including foreign subsidiaries and branches) is now paramount. At the global level, a greater sense of urgency as regards the activities of the Financial Stability Forum is key. The IMF is waved around briefly in the Treasury report, but what role it would play in the prevention of crises (enhanced multilateral surveillance, anyone?) or in their mitigation is not developed.

It is also clear that Basel II has to go back to the drawing-board. While some of the excesses of the recent past would not have been possible had Basel II been in effect (especially the ability of banks to make economic exposure disappear for reporting purposes through the creation of off-balance sheet vehicles), Pillars I and 2 of Basel II have three flaws which are, I believe, collectively fatal. One is the procyclicality of the capital requirements directive. The second is the reliance on internal models of banks to mark-to-model (i.e. mark-to-myth and mark-to-the-short-term-requirements-of-the-banks'-profit-centres) illiquid and often complex financial instruments and structures. The third is the reliance of the risk weightings on the ratings provided by discredited rating agencies.

The Report also mentions the need to improve the functioning of securitization markets, including improvements in valuation and credit-ratings agencies, but it offers very little beef in these areas. It is clear that the credit rating agencies will have to be unbundled and that the same legal entity should not be able to sell both ratings and advice on how to structure instruments to get a good rating. The conflict of interest is just too naked. Rating agencies will have to become single-product firms, selling just ratings.

The only two proposals for improving the operation of the securitization markets I have seen are not discussed in the report. The first is for the originator of the assets (home loans, say) underlying the securitization process to be required to retain the equity or first loss tranche of the securities issued against the underlying assets. This strengthens the incentives for delegated monitoring and reduces the severity of the principal-agent problem in the securitization process. The sec-

¹ The shadow banking sector consists of the many highly leveraged non-deposit-taking institutions that lend long and illiquid and borrow short in markets that are liquid during normal or orderly times but can become illiquid when markets become disorderly. They are functionally very similar to banks but are barely supervised or regulated. They hold very little capital, are not subject to any meaningful prudential requirements as regards liquidity, leverage or any other feature of their assets and liabilities. They also have very few reporting obligations and have to meet few governance standards, as many are privately or closely held. Examples are hedge funds, private equity funds, money-market funds, monolines, conduits, SIVs and other special-purpose, off-balance sheet vehicles.

and prescribes a 'gold standard' for simple and transparent securitization, as proposed recently by the UK Treasury, but – unlike the Treasury proposal – one with teeth. In a revised collateral framework, the Bank of England would only accept as collateral at the standard lending facility (discount window) or in open-market operations through repos, asset-backed securities conforming to the 'gold standard'.

One of the key drivers of the excesses of the most recent (and earlier) financial booms has been the myopic and asymmetric reward structure in many financial institutions, including banks and commercial banks. Clearly not all is well when the CEO of Citigroup, after marching his institution to the edge of the abyss, is let go with a golden handshake worth in excess of \$130 million. If that is the punishment for failure, what could be the reward for success? And this is just an extreme example of poorly structured reward systems that encourage excessive risk-taking and the pursuit of short-term profits. Where action to prevent such outrages in the future should be focused is not clear. It is fundamentally a problem of general corporate governance, not restricted to the financial sector: where were the shareholders of Citigroup? But there clearly is an urgent need for intelligent design here.

Reducing the likelihood of banks failing

There are some sensible proposals for enhancing the ability of the FSA to demand information at short notice.

Provision and disclosure of liquidity assistance

This part of the report is hamstrung by a failure to distinguish clearly between funding liquidity and market liquidity. Funding liquidity, which refers to the cost and availability of external finance (including the speed with which it can be accessed) is a property of economic agents and institutions. Market liquidity, which refers to the speed and ease with which an asset can be sold at a price close to its fair value and with low transaction costs, is a property of assets or financial instruments and of the markets in which they are traded. Funding liquidity and market liquidity are not independent; the funding liquidity of a market-maker or trader will influence the liquidity of the market he makes; the funding liquidity of a trader will depend on the market liquidity of the assets he holds or the liquidity of the markets in which he intends to borrow, secured or unsecured. There are private and public sources of both funding and market liquidity. When push comes to shove, only the public sector can provide instruments with unquestioned liquidity. Funding liquidity is provided by the authorities at the discount window (on demand against suitable collateral) and, in extreme circumstances, through lender-of-last-resort facilities. Market liquidity is provided by the authorities through open-market operations, both repos/reverse repos and outright purchases/sales, and, when markets become illiquid, by the authorities acting as market-maker of last resort, buying normally liquid but temporarily illiquid instruments at punitive prices and discounts.

Funding liquidity and market liquidity need not be provided by the same agency of the government, both in normal times and in extraordinary times. Only the central bank can realistically provide market liquidity, but the central bank need not be the active party deciding on the provision of funding liquidity, even if it is likely to be the (passive) source of such liquidity.

Covert operations: James Bond at the Central Bank

Quite a lot is made of proposals to allow the authorities (specifically the Bank of England), to provide covert liquidity assistance or other good offices. There are three sets of conditions under which covert assistance may be desirable.

First, there may be a use for secrecy surrounding assistance provided by the authorities during short-term windows of extreme vulnerability, say, just after a major fraud has been discovered. Of course, with the sophisticated control systems in place since at least Nick Leeson's destruction of Barings, a fraud that threatens a major institution is surely a thing of the past.

Second, there may be a use for secrecy surrounding the authorities' involvement in attempts to find a private-sector solution for a troubled or failing bank. Under the current UK takeover code, such covert assistance is problematic.

Third, there could be a need for secret lender of last resort assistance. Although the Bank of England's belief that covert lender-of-last-resort assistance would fall foul of the United Kingdom's transposition of the EU Market Abuse Directive, this turns out to have been a chimera. In any case, with effective deposit insurance and an effective special resolution regime (SRR) for troubled or failing banks, the need for both the second and the third kind of covert operation would vanish.

When safeguards fail

My recommended policies would likely strengthen the banking and financial sectors, reducing the risk of failure. But such a likelihood is impossible to eliminate. In my next article, I will address how the UK government could best prepare for a non-trivial bank failure.

Lessons from Northern Rock: how to handle failure

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This second article on the Treasury Committee's report on lessons from Northern Rock discusses the institutional arrangements needed to cope should a bank of non-trivial size fail.

In the article above, I examined proposals for preventing financial crises in the UK Treasury Committee Report 'The Run on the Rock'. Here I look at mechanisms that might reduce the impact of failing banks, provide appropriate deposit insurance and coordinate the three institutions responsible for financial stability.

Dealing effectively with failing banks

The authorities are effectively proposing to put in place the kind of legal and regulatory arrangements currently found in the United States and a number of other countries. A special resolution regime (SRR) would be created, led by a new authority (I shall call it the special resolution regime authority or SRRRA, not to be confused with the antidepressant drug SSRIs, lest we get some very depressed bankers), who could take control of a troubled bank before it hit the normal insolvency buffers, that is, inability to service its debt. The assets of the pre-failing bank, or any of its activities and business, could be transferred to one or more healthy banks or some other third party; a 'bridge bank' could be created to allow the SRRRA to take control of all or part of a bank or of its assets and liabilities; a restructuring officer could be appointed by the SRRRA to carry out the resolution; and finally, if the judgement is reached that pre-insolvency resolution is not feasible, a special bank insolvency procedure could be invoked to facilitate the swift and efficient payment of insured depositors. Public ownership of all or part of a bank as a last resort is also part of the package. The Treasury document refers to it as temporary public ownership, but unless this means that a fixed timetable has to be provided, the word 'temporary' only indicates hope or intent and is not operational.

The government proposes that the FSA would be the SRRRA, and I agree with that. It should not be the Bank of England (because the job of the SRRRA is too political) or the Treasury (because the Treasury is too political for the job of the SRRRA). A new separate entity would be possible, but further balkanization of the

responsibility for financial stability in the UK would seem undesirable (anyone really want a quadripartite arrangement?).

The key issue is the specification of the circumstances under which the SRRA would be able to impose the SRR on a bank. What will be the threshold conditions or triggers (quantitative or qualitative) that would cause the SRRA to compel a bank to enter the SRR? If the threshold is set too low, competition is distorted. If the threshold is set too high, there may be risk of systemic instability. Of course, with adequate deposit insurance and an appropriate bank insolvency procedure, contagion effects and other systemically destabilizing manifestations of panic ought not to happen. Even the failure of a large bank should not be of greater public interest than the failure of a ball-bearings manufacturer in Coventry with equal value added.

The Treasury believes the decision on whether and when a bank should be ordered into the SRR should be based on a regulatory judgement exercised by the FSA after consultation with the Bank of England and the Treasury. Provided it is clear that the ultimate decision lies with the FSA, I would agree with this proposal.

Deposit insurance

I believe that the new deposit insurance arrangements should be located in the same institution that has the SRRA, that is, the FSA. The existing Financial Services Compensation Scheme should either be moved into the FSA or wound up. In its current form it is useless.

As regards the limits of the insured amount, the current UK figure of £35,000 (since 1 October 2007, the idiotic run-inducing 10% deductible after the first £2,000 has been abolished) appears to be in the middle of the figures for 19 countries reported in the Treasury document. Eyeballing the charts, it looks as though about 97% of all retail deposit accounts hold less than £35,000. At the same time, the top 3% of deposit accounts hold about 50% of total deposits in the UK. This means that an increase in the limit would raise the value of the deposits covered by significantly more than it would raise the number of depositors covered. I cannot see a strong case for raising the limit, and no case for raising it above £50,000. What matters is the speed with which insured deposits can be paid out should a bank get into trouble.

Strengthening the Bank of England

It is apparent that the Bank of England, since it became operationally independent for monetary policy and lost banking supervision in 1997, has done a much better job on its monetary policy mandate of price stability than it has on its financial stability mandate. There has been really only one serious test of the UK's tripartite arrangement for financial stability between the Bank, the FSA and the Treasury. It failed the test. Much of the blame lies with current and past Treasuries and with the FSA, but the Bank contributed to the problems through its mismanagement of market liquidity. The Treasury report does not address this issue at all.

It is key that the Bank of England should follow the example of the ECB and extend its list of eligible collateral at the standing lending facility and in open-

market operations to include routinely private securities, including asset-backed securities. It should also extend the maturity of its standing lending facility loans from overnight to up to one month, taking a leaf from the Fed this time. Finally, it should extend the list of eligible counterparties at the standing lending facility and in its repo operations to include not just banks and similar deposit-taking institutions. Currently, open-market operations are open to non-cash ratio deposit-paying banks, building societies and securities dealers that are active intermediaries in the sterling markets. Access to the standing facilities is restricted to participants in the Bank of England's Reserves scheme and a few others. Both open-market operations and standing facilities should be accessible to all financial institutions regulated in a manner approved of by the Bank.

While in a first-best world, the Bank would not be the active player in lender-of-last-resort operations, it will always be involved in funding liquidity matters through its standing facilities. It is therefore key that the use of the standard lending facility be de-stigmatized. This can be achieved by abolishing the unbelievably complex operational procedures for setting the official policy rate or bank rate (official policy sets the target for the overnight unsecured sterling interbank rate) and managing short-term liquidity.

The current framework has three main elements: rather plain-vanilla standing facilities and open-market operations and a mysterious and pointless reserves-averaging scheme (from the Bank's Redbook): 'UK banks and building societies that are members of the scheme undertake to hold target balances (reserves) at the Bank on average over maintenance periods running from one MPC decision date until the next. If a member's average balance is within a range around their target, the balance is remunerated at the official Bank Rate.'

The reserves-averaging scheme should go. There should be no reserve requirement at all. The Bank should stand ready to repo (against eligible collateral) or reverse repo any amount at any time at the official policy rate. That, after all, is what it means to set the official policy rate. Anything else is an attempt to set both price and quantity – and is doomed to failure.

Commercial banks would therefore be borrowing from the Bank of England all the time, as a matter of routine, and no stigma would be attached to such operations. This would also keep the overnight interbank rate closer to the official policy rate than it is under current procedures, decoupling the MPC's interest-rate decision from the liquidity policy not managed by the MPC but by the Bank's executive. The Bank still could retain its standing lending facility by accepting a wider range of assets as collateral at the standing lending facility than it accepts in repos to peg the official policy rate.

In its open-market operations, the Bank should act as market maker of last resort, by standing ready to purchase, at a properly conservative/punitive price, normally liquid assets that have become illiquid through a systemic flight to quality and liquidity caused by fear, panic and other contagion effects. As for the securities acceptable for rediscounting at the standing lending facility, there should be a positive list of securities (including private securities and indeed private ABS) that are acceptable as collateral by the Bank. This would help concentrate the minds of (the supervisors of) those maniacal financial engineers generating ever more complex and opaque financial structures, which would be unlikely to figure on the list of eligible collateral.

What becomes of the tripartite arrangement?

It is obvious that, whenever taxpayers' money is put at risk, the Treasury must be consulted and should have a veto over the operation. The Treasury document makes this clear. The Treasury is also in charge of the whole arrangement, although it appears obvious that there are certain things it cannot instruct the two other parties to do without risking damaging resignations. I doubt whether it could give the Bank instructions on its collateral policy, open-market operations and standing facilities operations. In my view it ought not to be able to do so. It is also unclear whether the Treasury expects to be in a position to instruct the SRR (that is, the FSA) to invoke or not to invoke the SRR for a particular bank. I would hope it would not be able to do so. What the role of the Treasury would be in the decision to invoke the new bank insolvency procedure remains unclear. Obviously, nationalization could only be authorized by the Treasury.

In the proposals of the Treasury, the FSA continues to be the regulator and supervisor of the banking sector (and of most other financial institutions). It remains responsible for the default risk (solvency), the funding liquidity of the institutions it supervises and other risks, including operational and reputational risk. It will lead the SRR and act as the SRR. I assume it would also be responsible for the management of the deposit insurance scheme, although the Treasury document is not clear on this. The Bank of England does get its nose into the tent for most of these activities and responsibilities, however. To my mind this further troubles the allocation of responsibility and authority.

The financial cost of the deposit insurance scheme can only be borne by the participating institutions (either through pre-funding or ex-post funding) if the banking-sector trouble causing the scheme to be called upon for a payout is a local problem affecting only a minority of the banks. When there is a systemic bank run (or bank default), only the Treasury can credibly meet the insurance claims. This should be recognized. Any serious deposit-insurance scheme represents a contingent claim on the Treasury.

The Bank of England remains responsible for market liquidity, both in normal times and, under disorderly market conditions, by acting as market-maker of last resort. It is involved in funding liquidity through the (on demand against the proper collateral) standing lending facility. The Treasury report (and even more strongly the Treasury Committee report) favours an enhanced role of the Bank of England in the lender-of-last-resort process. The Treasury report wants the Bank to spend time and resources becoming and remaining informed of the liquidity situations of individual UK banks. This clearly would also require it to be aware of the solvency-related aspects of the balance sheet and operations of individual banks. The Bank and the FSA would effectively become joint supervisors with shared responsibility for funding liquidity and solvency. I doubt whether such an arrangement would work well.

As far as I can tell, the Treasury Committee wants all banking supervision and regulation to be returned to the Bank of England, with the FSA taken completely out of the game. A new deputy governor and head of financial stability would take the lead in all financial stability matters, and could even order the FSA around.

It is clear that the Treasury Committee's proposal would put strains on the Bank of England's independence in monetary policy. The committee therefore raises the

possibility that the new deputy governor/financial stability czar might not be a member of the MPC. I still cannot see it. What would be the authority relationship between the new deputy governor/financial stability czar and his/her notional boss, the governor? If the Bank of England is to be put in charge of (the operational end of) financial stability, better not to appoint a new deputy governor but to give the job to the governor and to take the MPC out of the Bank of England. The governor of the Bank would, under this model, not necessarily be the chair of the MPC or even a member of it.

A different solution

Rather than putting money and individual bank-specific information together in the same institution by making the Bank of England responsible for banking supervision again, I would move in the opposite direction. The lender of last resort (which would not be the Bank of England although the lender of last resort, if it is not the Bank of England should have an open-ended uncapped credit line or overdraft facility with the Bank of England, guaranteed by the Treasury) should be the SRRA, that is, the FSA. It would make liquidity available to a troubled bank that could no longer fund itself in the interbank markets, the repo markets or at the standing lending facility. The collateral that would be accepted, the terms on which it would be accepted, and the other terms and conditions attached to lender-of-last-resort funds would be decided by the SRRA (the FSA) on a case-by-case basis.

The current tripartite arrangement is sketched in Figure 1. The Treasury Committee's proposal is in Figure 2, the Treasury's proposal in Figure 3 and my own proposal (for a minimalist central bank) in Figure 4. Finally, Figure 5 shows how, under my proposed arrangement, a potentially troubled bank would be handled.

With effective deposit insurance and a sensible insolvency regime for banks, all proposals share the feature that it could, at last, become conceivable that a non-trivially small bank in the UK might fail. That would be the best guarantor of greater future financial stability.

Figure 1

The Current Tripartite Arrangement

	Financial Stability		
	Solvency	Liquidity	
		Funding Liquidity	Market Liquidity
Regulator (FSA)	✘		
Central Bank (BoE)		✘ (Discount window & LoLR)	✘ (Regular OMOs & MMLR)
Treasury	✘	✘ (Solvency of LoLR only)	✘ (Solvency of MMLR only)

Figure 2

The Treasury Committee's Proposal

	Financial Stability		
	Solvency	Liquidity	
		Funding Liquidity	Market Liquidity
Regulator (FSA)	✘		
Central Bank (BoE)	✘	✘ (Discount window & LoLR)	
	Deputy Governor of BoE and Head of Financial Stability		✘ (Regular OMOs & MMLR)
Treasury	✘	✘ (Solvency of LoLR only)	✘ (Solvency of MMLR only)

Figure 3

The Treasury's Proposal

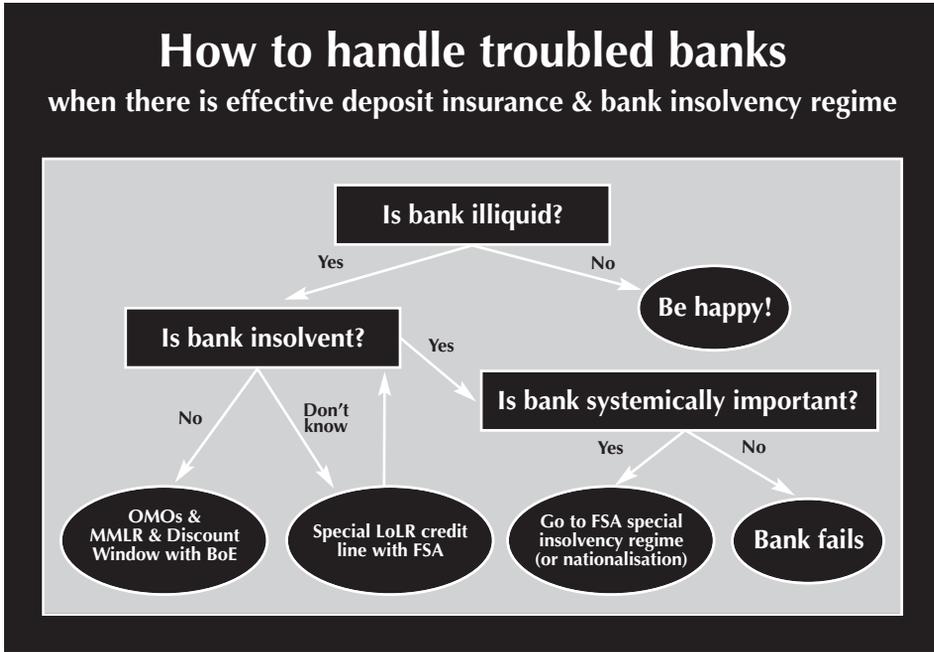
	Financial Stability		
	Solvency	Liquidity	
		Funding Liquidity	Market Liquidity
Regulator (FSA)	✘	✘	
Central Bank (BoE)	✘	✘ (Discount window & LoLR)	✘ (Regular OMOs & MMLR)
Treasury	✘	✘ (Solvency of LoLR only)	✘ (Solvency of MMLR only)

Figure 4

The Tripartite Arrangement with a minimalist central bank

	Financial Stability		
	Solvency	Liquidity	
		Funding Liquidity	Market Liquidity
Regulator (FSA)	✘	✘ (LoLR)	
Central Bank (BoE)		✘ (Discount window only)	✘ (Regular OMOs & MMLR)
Treasury	✘	✘ (Solvency of LoLR only)	✘ (Solvency of MMLR only)

Figure 5



Ratings agency reform

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Recent financial market troubles highlight a number of problems with the credit-ratings agencies. This article argues that only a few of the proposed policy solutions are likely to be both feasible and helpful.

The recent financial-market turbulence has brought credit-ratings agencies under fire. Finance ministers from the United Kingdom, France, Germany and Italy met last Thursday to discuss the financial turmoil and strengthening government regulation. There are indeed problems with the agencies, but many suggested policy remedies are equally problematic.

The agencies

Ratings agencies exist to deal with principal-agent problems and asymmetric information.¹ Company managers or sovereign finance ministers may seek to mislead investors. Requiring a minimum rating can limit the risk for asset owners and guarantors if an asset manager would otherwise invest principals' funds in high-risk assets. The agencies help investors overcome their lack of information about the variables that will determine whether a borrower will service debt. The agencies are gatekeepers, like auditors, investment analysts and journalists. But they are more profitable and have higher price-to-earnings ratios and more acute conflicts of interest.

There are so few ratings agencies² partly because of network effects, in so far as investors want consistency of ratings across issuers. But the natural monopoly characteristics are enhanced by the dependence of regulators on ratings, as (for example) formalized in the 'national recognized statistical rating organizations' (NRSRO) status created in the United States in the mid-1970s and in the Basel II regulations. A wide range of investors are required not to hold securities whose ratings are below investment-grade, and ratings affect the risk weightings of banks'

1 See R. Levich, G. Majnoni and C. M. Reinhart, eds (2002), *Ratings, Rating Agencies and the Global Financial System*, New York: Kluwer Academic Press.

2 The big three (S&P, Moody's and Fitch) take an estimated 95% of the market (Variances 32, ENSAE, December 2007).

assets in calculating capital adequacy ratios. The regulators determine whether an agency holds this regulatory licence, and this is a barrier to entry.³

The problems

There are several problems associated with the agencies, in terms of both the incentives they face and the performance of their roles. There is an apparent conflict of interest most acute with structured finance instruments, in so far as an agency may first advise on how the construction of a security would affect its rating and then issue a rating that confirms its advice, earning two separate fees in the process. This problem has grown hugely: 44% of Moody's revenues in 2006 came from its structured finance activities. Moreover, there is an apparent incentive (in)compatibility issue: the issuer pays for the rating and may shop around for the best deal (a favourable rating), while the agency may be inclined to reward an issuer that chooses it over the other agencies.

The agencies' performance is also problematic. They are blamed for reacting ex-post rather than anticipating; the ratings are lagging indicators. Ratings changes may be procyclical (an effect that might be accentuated by Basel II) and may create herd effects, magnifying instability. Both were strong criticisms during and after the Asian crisis, and Fitch, for example, accepted their validity in their mea culpa of February 1998.⁴

The agencies' data and their models are suspect. In rating residential mortgage-backed securities involving subprime mortgages, for example, the agencies used data from an extended period of rapidly rising house prices, during which doubtful mortgages had been validated as householders' equity grew. And rating complex structured finance instruments on the basis of model simulations may not be helpful when markets become disorderly, tail risk materializes, actual correlation risk far exceeds the models' parameters and the models blow up. Moreover, it may be inappropriate to use the same metric to evaluate sovereign risk, corporate-bond risk and complex instruments like CDOs. In each context, the rating reflects the agency's estimate of the probability of default over a given period – nothing more. It ignores, for example, the possibility that the market for the security may become illiquid; and it ignores the likely recovery rate if the security defaults.

Most importantly, a significant literature finds that the agencies simply do not add value: the quality of information they provide is often no better than that which a good analyst could extract from publicly available data. Detailed studies cast doubt on their ability to assess credit quality better than measures based on market spreads or to predict major changes.⁵

3 See F. Partnoy (2006), 'How and Why Credit Rating Agencies are not like Other Gatekeepers', Legal Studies Research Paper No. 07–46, University of San Diego School of Law. Some argue that the agencies are now just a whipping-boy or scapegoat. Sophisticated investors, it is said, should have recognized the dangers in the new, complex financial instruments, and others should not have invested in them. But the regulatory licence exists precisely because the regulators do not accept these arguments.

4 *Financial Times*, 13 February 1998.

5 There are several such papers in Levich et al. (2002).

Market characteristics

There is a number of identifiable sources of these problems. They suggest some directions for policy and some constraints on policy. There is a clear public-good aspect of the information that the agencies provide. Hence there is a free-rider problem, and payment by the user of the information will be either suboptimal or unenforceable. (Nevertheless, until the early 1970s, it was in fact the users of the ratings who paid, by subscription.) This aspect gives an efficiency argument for market concentration, which eliminates duplication of effort in generating information that will be available to all.

The agencies do not take full responsibility for their ratings. In fact, they have successfully (so far) maintained legal immunity from malfeasance claims on the ground that they are only financial journalists publishing their opinions, which are protected free speech. That Moody's is much more profitable than the *Financial Times* or the *Wall Street Journal* may suggest, however, that they are in fact earning some rents. In addition to a return on their reputational capital, which is what they claim to sell,⁶ they are also selling the regulatory licence conferred by their roles in the regulatory regime. Doesn't this status make their 'speech' rather different from that of a securities analyst or an FT columnist? One might also infer rents attributable to the regulatory licence from the profitability of CDOs. After all, these just repackage existing securities; the apparent source of 'value' is the rating gain.

Potential policy solutions

Academics and policy-makers have considered numerous proposals, from nationalizing the agencies to abolishing official recognition of their ratings. The underlying incentive difficulties create a classic mechanism design problem, but there is so far no formal analysis that could inform policy. And there are no easy answers.

Officials often support a voluntary code of conduct, since the market participants will lobby heavily against anything stronger. But the International Organization of Securities Commissions already promulgated a code of conduct at the end of 2004. According to the French *Autorité des Marchés Financiers* (AMF), by early 2007 it had been implemented in a 'globally satisfactory' manner. But the AMF still expressed concerns at that time about the roles and performance of the agencies in the structured finance markets – and rightly so, because the code has no teeth. Voluntary codes cannot solve the incentive problems.

Some have argued that public goods should have public funding. But there are obvious dangers in effectively nationalizing the agencies. A feasible alternative may be reviving subscription: a levy on users (investors).⁷ Some observers suggest that standardization of ratings across agencies would be helpful. If that just means using the same notation for a given probability of default, it is trivial. Anyone can

6 It is argued that the recent fall in Moody's share price indeed reflects a downgrading of its reputation. More likely, however, it is due to the collapse of the structured finance business.

7 A newly certified NRSRO, Egan-Jones, operates with a subscription model, giving subscribers immediate access to new ratings information and releasing it publicly with a lag (John Dizard, *Financial Times*, 14 January 2008).

convert a Moody's rating into an S&P rating. If it means standardizing valuation models, it would eliminate competition, but not entirely, because the agencies might feed different data into the same model, but one would then like to know why the data differ.

Regulators could require the agencies to provide more information than just a specific rating: an assessment of the liquidity characteristics of the instrument, of the likely volatility of its market price etc. But the agencies do not seem well equipped for this: 'As a result of unprecedented price volatility, Moody's has adapted its methodology [for rating structured investment vehicles].'⁸ That does not say much for Moody's data analysis: in fact, by all measures, volatilities during August 2007 were not significantly higher than in May 2006 (for example) and were much lower than in autumn 1998. But the analytical problems here are formidable. The extensive academic literature on liquidity risk and market risk gives little guidance on how to estimate them quantitatively. And the underlying conditions change more rapidly than the fundamentals governing default risk, so the corresponding ratings would have to adjust frequently. That might confuse investors and add to market volatility.

The agencies should at least, however, provide a range for the risk of each instrument rather than a point estimate; or they should develop a distinct rating scale for structured finance products.⁹

Some propose introducing explicit legal liability for negligence or malfeasance. But this is likely to lead to the demise of the agencies, and they would get sued out of business.

Separating rating from consultancy and advisory functions seems obviously desirable, and Chinese walls will not do. But forcing the agencies to give up the highly remunerative advisory work will be extremely difficult politically. Resistance might weaken if the structured finance business disappears, as some suggest it will, but then the problem disappears too.

There should be more competition among agencies: new entrants. Of course we all believe in competition, or at least market contestability, but as noted, there are aspects of the industry that suggest natural monopoly. And with more agencies, we might see a race to the bottom as issuers seek the agency that will rate them most favourably. Some observers report that investment banks shopped around for higher ratings in securitizing subprime mortgages.

Could not the regulators substitute market valuations (spreads, say) for ratings? The agencies maintain that these are too volatile, but one could use a smoothed moving average. More important is that many securities effectively have no market: they are bought by buy-and-hold investors. And many others are fairly illiquid: the average number of trades per day for a UK corporate bond is two (three for a euro-denominated bond).¹⁰ Credit default swap prices might deal with that problem, but that will not help in the primary market, which is where the impact of the ratings has been so pronounced in the recent period.

8 Moody's 'Update', 5 September 2007.

9 R. Ferguson, P. Hartmann, F. Panetta and R. Portes (2007), *International Financial Stability*, CEPR and ICMB.

10 B. Biais et al., 2006, *European Corporate Bond Markets: Transparency, Liquidity, Efficiency*, CEPR.

Some suggest eliminating the regulatory licence by abolishing recognition, that is, removing the NRSRO designation and merely requiring agencies to register with the regulators. This would confer no official status on the ratings. It would also vastly increase the burden on the regulators, but with increased budgets, they could hire people from the agencies (Moody's has just announced layoffs). This proposal would also suppress the role of the ratings in Basel II. After all the effort put into Basel II, however, the regulators as well as the agencies have strong vested interests in it.

Conclusion

Perhaps recent experience will give enough support to the critics to override the political and lobbying obstacles to some of the more promising proposals. Without policy changes, the structural problems will surely persist.

How to avoid further credit and liquidity confidence crises

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Uneven supervision gave an edge to risk-takers in some countries on the up side, but the pain is being felt all around Europe on the down side. To avoid future crises, all mortgage originators should be regulated, banks should have to retain their equity or first loss risk, the ratings agencies should be more transparent and independent, and Europe's coordination failure among national supervisors should be fixed.

The US banking authorities and the EU finance ministries, central banks and supervisory authorities are trying to design a roadmap to strengthen financial stability and crisis prevention after experiencing the effects of the present confidence crisis. In principle, the best way to try to avoid another credit confidence crisis is just to learn from what went wrong in the present one, to make the necessary changes and to develop new policies. By now, it seems clear that some market, regulatory and supervisory failures have taken place in the last few years of low interest rates and leveraging euphoria that need to be addressed.

Subprime mortgage lending is not new. It has existed for a long time in consumer finance both in the United States and Europe, although subprime mortgage finance is much more important in the United States. The key to successful subprime lending is to develop a very good credit scoring based on data concerning the historical behaviour of borrowers, both collectively and individually. These are then applied to interest rates for every type of borrower and marked high enough to more than compensate for their expected levels of non-performing loan losses.

The main problems with subprime mortgage lending in the United States have been the following. First, half of their originators are agents and brokers, which are not part of a banking group and thus fall outside federal banking regulation. Moreover, these agents and brokers get paid by commissions based on the number of mortgage loans that they are able to sell to households, so that their incentives have nothing to do with the default risk involved in the loan, but, on the contrary, the higher the risk of the borrower, the larger the commission.

Second, the other half of the originators are banks, which sometime ago tended to hold the mortgage for some years in their books, so as to have an incentive to be careful about its non-performing risks. But today, both brokers and banks which originate these loans sell them very quickly either directly or through another financial intermediary, which then securitizes and sells them to investors, thus losing their traditional incentive to monitor their risk. The way these mort-

gages are securitized is based on pooling thousands of mortgages and other loans in an off-balance sheet vehicle which issues marketable CDOs or CLOs (Collateralised Loan Obligations) representing shares in the pool.

Third, unlike in most countries in Europe, in the US legal system subprime mortgage loans carry a much higher risk for the lender because there is no legally binding property register; the loan does not give the lender the right to repossess the property, regardless of who owns the house, and the repossessing system varies from one state to another.

Fourth, there are always risk-hungry investors who are ready to invest in higher risk-higher-yield financial products like the CDOs, but the problem this time is that these products are so complex that either they were not able to understand fully what they were buying or did not want to invest enough on disentangling their supporting models before purchasing them. The fact is that even the more sophisticated risk-hungry investors (as the hedge funds) did not really know well enough how to value these assets and eventually they had to trust the rating given by the independent ratings agency involved in the securitization.

Fifth, although securitization is a great innovation which makes it possible for banks to extend affordable mortgages to many more households (mainly the low-income ones) and to small and medium-sized firms, such complex financially structured products are extremely difficult to value and also to rate. In the old times, a triple or double 'A' rating was usually given to security issued by a highly stable and solvent country or company which was quoted daily in an organized market. Today, one of these CDOs can achieve a triple or double A rating, when they are composed of blocks of different ratings, from 'senior' (double or triple A) and 'mezzanine' (triple B) to 'equity' (triple B-, triple C or less).

It looks like alchemy but sophisticated mathematical models were supporting these ratings based on the fact that, given the large number of loans pooled, their probability of default was much less correlated than in the case of one single or several loans, since, in principle, it is more unlikely that all default at the same time. Moreover, these structured products do not trade and are not quoted in organized markets. They are mostly customized to suit different investors, so that they are only sold over the counter. As such, their price transparency and market liquidity tend to be extremely low.

Sixth, the rating agencies have been classifying these products and their different tranches with their own models without any apparent problem. However, since last June, they have started to downgrade them quickly, given the accelerating rate of non-performing subprime loans and the progressive falling of average house prices in the United States. This general and fast downgrading has had a detonating negative effect on the investor's confidence in the real value of these products. This, in turn, has triggered the present situation of general uncertainty and lack of liquidity for these and other related products collateralized with mortgages and even of other medium- and long-term loans.

Credit-ratings agencies: charges and countercharges

The ratings agencies have come under attack for their role in all this. They have a conflict of interest (they are paid by the issuer of these products and not by the

buyer) and their ratings do not seem to have got it right, at least according today's market. Even if nowadays there are still few transactions, the ABX.HE indexes (January = 100) show that, on average, some triple-A rated asset-backed mortgage-structured securities are being sold with a loss of 6 percentage points, that double A show a loss of 20 percentage points, that single A sell at a loss of 50 percentage points, that triple B show a loss of 65 percentage points and that triple B trade at a loss of 70 percentage points.

The ratings agencies have counterattacked by showing that, at the demand of the sellers, their ratings were made only on the default risks of these securities, which have been downgraded accordingly to the new information appearing in the marketplace, but not on their market and/or liquidity risks, which are even more complex (and expensive) ratings. They argue that it is the present lack of liquidity that makes those securities lose value, and not so much their probability of default which was rightly captured by their ratings.

The curious geographical transmission of the crisis

Another problem is how is it possible that a relatively minor and expected issue (with present losses of about \$200 billion) arising in the subprime mortgage market in the United States has been able to contaminate so many US and European banks and markets. The answer is that it is because of the large proliferation of conduits and SIVs created by them off-balance sheet, in order to avoiding regulatory capital consumption, to invest in long-term assets, financing them by issuing commercial paper backed by these assets.

Their basic aim was to borrow short and invest long (as banks always do) in a way that was more profitable since it allowed them to lend without consuming their regulatory capital, that is, without having the investment on balance sheet and therefore counting in their loans-to-capital requirements. The volume of conduits created is large (around \$600 billion in the US banks and around \$500 billion in European banks). These banking conduits did invest in CDOs and CLOs issued by US and other European banks which had subprime loans among other better-rated corporate and mortgage securities.

Nevertheless, the main problem with banks in the United States and Europe is not only that their conduits invested in subprime and other low-quality credit-structured products, (when their assets were meant to be of higher grades) but that, when their asset-backed commercial-paper market financing dried up, the borrow-short-lend-long wheel stopped. The conduits have to pay off their short-borrowing positions, but have problems selling off their long-lending positions.

This left the banks with two options: take them into their balance sheets, provoking a credit crunch, or get enough temporary liquidity from a central bank to refinance them – to keep the wheel turning, as it were. The credit crunch in the case of the euro-area banks would not be very large, but it would be substantial. The average ratio of regulatory capital to total loans is 8% in euro-area banks. The total volume of conduits needed to be taken into their balance sheets would absorb only 0.7 percentage points of that ratio, that is, on average, they would have to reduce total lending by 8.75% to absorb them. But for some banks with lower capital levels the impact would be fairly large.

Avoiding future crises

Regulators, supervisors and central banks should try to solve these perverse incentives and problems with conflict of interest that have led to the crisis. Here are some of the measures they should take, besides continue to inject liquidity until some confidence is regained.

First, the US banking authorities should regulate all US agents and brokers which are originating these mortgage loans in order to avoid their perverse incentives when dealing with their potential borrowers and to try to standardize their property registration and collateral execution systems across states.

Second, all banking supervisors should oblige all banks, which originate and sell loans and mortgages, to retain their equity or first loss risk block, as it happens today in some European countries, in order to make them share part of the risk when they sell them to intermediaries or final investors and, therefore, to be much more careful when monitoring their credit risks and when choosing the mortgages to be pooled for sale.

Third, the banks and financial institutions, which structure and securitize these loans, should be extremely transparent about their package processes, their supporting models and their associated risks. Moreover, they should try to increase the standardization of these products up to making them suitable to be traded in an organized and transparent market.

Fourth, the ratings agencies should try to regain credibility by showing that they are truly independent and that their rating process is fully transparent and reliable, mainly for these complex structured products.

Fifth, in the case of conduit proliferation there has been a major supervisory coordination failure, at least in Europe, given that some central banks (as in Spain) have not allowed their supervised banks to create these conduits while other supervisors have done so at large. It is clear that these conduits have been created mainly by sophisticated wholesale banks and not so much by more traditional retail banks, but it is even clearer that in those countries where the banking supervision is not done by the central bank, but by another government agency or institution, the problem created by conduits has been much larger in size and risk involved. The main examples are Germany, the United Kingdom and the United States (with the Netherlands the main exception to this rule). The case in point is probably the United Kingdom, where the tripartite division of responsibility between the Treasury, the Bank of England and the FSA has complicated to the extreme an, in principle rather easy, sale of Northern Rock to another bank, which eventually has ended in an expensive bank run and a bailout.

This issue is extremely important for two reasons. First, some supervisors in the euro area, without coordinating with their other euro-area colleagues or even with their central banks, have allowed their supervised banks to develop a competitive advantage over other competing euro-area banks, in the same single market, by allowing them to create large and highly profitable (but risky) conduits. Second, now, when such decisions have proved to be wrong and the conduits are on the verge of producing a credit crunch unless they are refinanced by the ECB system, all the rest of the banks without conduits in the euro area are also suffering the consequences of that decision. Something needs to be done about these supervising structures to avoid this lack of coordination in the future.

The inappropriateness of financial regulation

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Financial regulation never works the way it should. Here one of the world's most experienced analysts of the global financial system presents some remarkably clear thinking on why we should not just do more of the same. An alternative model for policy action is proposed.

I have had the misfortune or fortune of being up close and personal with seven major financial crises in my banking career, from the US savings and loans crisis of the late 1980s to today's credit crunch. In each crisis I have observed a cycle in the response to the crisis. In the middle of a crisis, when circumstances look dire and chunks of the financial system are falling off, proposals get radical. I recall in December 1992, with the United Kingdom and Italy having already been ejected from the European Exchange Rate Mechanism and Spain and Portugal looking vulnerable, some European policy-makers flirted with capital controls. But a few months after each crisis is over, these radical plans are tidied away and we are left with three things. And they are always the same three things: better disclosure, prudential controls and risk management.

These measures are the regulatory version of apple pie and ice cream. Who would say no? The thing is that we have been investing heavily in these areas for the past 20 years and do not have much to show for it in terms of financial stability. Over the past 11 years we have had the Asian financial crisis, LTCM, the 'dotcom bezzle' and now the credit crunch. While more disclosure, controls and risk management are generally good things and necessary fraud-reducing measures, there are few crises I have known from the inside that would not have happened if only there had been more disclosure. People knew that subprime was a poor risk – it is called subprime, after all.

Regulatory shortcomings

The problem is more fundamental, and, unless we address these fundamental issues, we will be condemned to repeat the cycle of boom and bust. Lying close to the heart of the problem in all these recent crises, from today's credit crunch to the savings and loans debacle and beyond, is the inappropriateness of financial regulation.

My own view of banking regulation would be considered quaint next to today's practice. I consider the primary objective of intervening in the banking market to be mitigating the substantial systemic consequences of market failure in banking. It is therefore puzzling to me that market prices are now placed at the heart of modern financial regulation, whether in the form of mark-to-market accounting or the market price of risk in risk models. It is not clear to me how we can rely on market prices to protect us from a failure of market prices. I have discussed this before many times, so I will focus on the secondary objective, which is to avoid the discouragement of good banking.

A good bank is one that lends to a borrower that other banks would not lend to because of its superior knowledge of the borrower or one that would not lend to a borrower to which everyone lends because of its superior knowledge of the borrower. Modern regulators believe this is too quaint, and, to be fair, many banks were not any good at it. But instead of removing banking licences from these banks, regulators decided to do away with relationship banking altogether and promoted a switch away from bank finance to market finance where loans are securitized, given public ratings, sold to many investors including other banks and assessed using approved risk tools that are sensitive to publicly available prices. Now, bankers lend to borrowers that everyone else is lending to, the outcome of a process where the public price of risk is compared with its historic average and a control is applied based on public ratings.

Market finance

This switch to market finance improved search liquidity in quiet times. Credit risk that was previously bundled with market and liquidity risk was separated, priced and traded. This has improved the transparency and tradability, but it comes at the expense of systemic liquidity in noisy times.

Almost every economic model will tell you that if all the players have the same tastes (reducing capital adequacy requirements) and have the same information (public ratings, approved risk models using market prices), the system will sooner or later send the herd off the cliff edge (Persaud, 2000). And no degree of greater sophistication in the modelling of the price of risk will get round this fact. In this world, where falling prices generate more sell orders from price-sensitive risk models, markets will not be self-stabilizing but destabilizing and the only way to short-circuit the systemic collapse is for a non-market actor, like some agent of the taxpayer, to come in and buy up assets to put a floor under their prices. (I wrote about this liquidity tradeoff with some colleagues: Laganá et al., 2006.)

Now this is a legitimate model: the marketization of finance and the resulting improvement in search liquidity in quiet times, coupled with direct state intervention in the crisis. It is the model we have today. But I venture that it is a highly dangerous model. It is expropriation of gains by bankers and socialization of costs by taxpayers. Paying for a decade of bank bonuses can be very expensive for the taxpayer and the opportunities for moral hazard are enormous.

An alternative approach

The alternative model rests on three pillars. The first recognizes that the biggest source of market and systemic failure is the economic cycle and so regulation cannot be blind and deaf to the cycle, it must put it close to the centre. Charles Goodhart and I have proposed contra-cyclical charges, capital charges that rise as the market price of risk falls, as measured by financial market prices, and a good starting point for implementation of such charges is the Spanish system of dynamic provisioning (Goodhart and Persaud, 2008).

The second pillar focuses regulation on systemically important distinctions, such as maturity mismatches and leverage, and not on outdated distinctions between banks and non-banks. Institutions without leverage or mismatch should be lightly regulated – if at all – and in particular would not be required to adhere to short-term rules such as mark-to-market accounting or market-price risk sensitivity that contribute to market dislocation. Bankers will argue against this, saying that it creates an unlevel playing field, but financial markets are based on diversity, not homogeneity. Incentivizing long-term investors to behave long-term will mean that there will be more buyers when banks are forced to sell.

The third pillar is requiring banks to pay an insurance premium to taxpayers against the risk that the taxpayers will be required to bail them out. If such a market could be created, it would not only incentivize good banking and push the focus of regulation away from process to outcomes, but it would also provide an incentive for banks to be less systemic. Today, banks have an incentive to be more systemic, as a bailout is then guaranteed. The right response to Citibank's routine failure to anticipate its credit risks is not for it to keep on getting bigger so that it can remain too big to fail, but for it to wither away under rising insurance premiums paid to taxpayers.

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There is more to central banking than inflation targeting

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Inflation targeting proponents view central banks' responsibilities as minimalist. But the subprime crisis shows that central banks cannot avoid taking responsibilities that include the prevention of bubbles and the supervision of all institutions that are in the business of creating credit and liquidity.

The credit crisis that hit the world economy in August teaches us many lessons about the workings of integrated financial markets. It also teaches us a lesson about the responsibilities of central banks.¹

Until the eruption of the credit crisis, the consensus view was that central banks should target inflation, and that is pretty much all they should do.² In this view, central banks should not target (or try to influence) asset prices, either – as was stressed by Greenspan – because bubbles cannot be recognized ex-ante, or – if they can – the macroeconomic consequences of bubbles and crashes are limited as long as central banks keep inflation on track. Inflation targeting, we were told, is the new best-practice central banking that makes it unnecessary for central bankers to try to influence asset prices.³

The credit crisis has unveiled the fallacy of this hands-off view. If the banking system were insulated from the asset markets, the view that monetary policies should not be influenced by what happens in asset markets would make sense. In that case, asset bubbles and crashes would only affect the non-banking sector, and a central bank is not in the business of insuring private portfolios.

The problem that we have seen in the recent crisis is that the banking sectors were not insulated at all from movements in the asset markets. Banks were heavily implicated both in the development of the bubble in the housing markets and

1 This is an expanded version of a *Financial Times* column published on 2 November 2007.

2 An influential paper making the case that central banks should not try to influence asset prices is B. Bernanke and M. Gertler (2001), *Should Central Banks Respond to Movements in Asset Prices?*, *American Economic Review* (May), pp. 253–7. Although this has become the consensus view, there are prominent dissenting views also. An example is S. Cecchetti, H. Genberg, J. Lipsky and S. Wadhvani (2000), *Asset Prices and Central Bank Policy*, Geneva Report on the World Economy 2, CEPR and ICMB [[check details]]. Among the major central banks it is remarkable that the ECB has defended the view that central banks should lean against the wind when asset bubbles arise (see *Monthly Bulletin*, April 2005).

3 Proponents of this view have argued that flexible inflation targeting that takes a sufficiently long-term perspective is sufficient to deal with asset bubbles, i.e. flexible inflation targeting can be tailored in such a way that the longer-run consequences of asset prices are taken into account when setting interest rates (see Charles Bean, 2003, *Asset Prices and Monetary Policy*, Federal Reserve Bank of Australia, November).

in its subsequent crash. And since the banking system was heavily implicated, the central banks were also heavily involved by the very fact that they provide insurance to the banks in the form of the lender of last resort. Some may wish that central banks would abstain from supplying this insurance. Economic theory, however, tells us that central banks should intervene to provide liquidity if the liquidity crisis risks disrupting the payments system, thereby hurting many innocent bystanders. In addition, reality ensures that central banks are forced to provide liquidity when a crisis erupts, as they are the only institutions capable of doing so.

Thus, when asset prices experience a bubble, it should be a matter of concern for the central bank because the bubble will be followed by a crash, and that is when the balance sheet of the central bank will inevitably be affected. It is not reasonable for a central bank to argue that asset bubbles and crashes should not be a source of concern and therefore that it should not try to intervene when a bubble arises, when it knows that the bubble will have large implications for its future balance sheet and its profits and losses.

There is a second reason why the hands-off approach has been shown to be wanting. During the last few years, a significant part of liquidity and credit creation has occurred outside the banking system. Hedge funds and special conduits have been borrowing short and lending long, and as a result, have created credit and liquidity on a massive scale, thereby circumventing the supervisory and regulatory framework. As long as this liquidity creation was not affecting banks, it was not a source of concern for the central bank. However, banks were heavily implicated. Thus, the central bank was implicitly extending its liquidity insurance to institutions outside the regulatory framework. It is unreasonable for a central bank to insure activities of agents over which it has no oversight, very much as it would be unreasonable for an insurance company selling fire insurance not to check whether the insured persons take sufficient precautions against the outbreak of fire.

Policy implications

So what can be done about this? There are two possible solutions. The first one is for the central bank to recognize that asset bubbles are a source of concern and that it should act upon their emergence. The argument that a bubble can never be recognized *ex-ante* is a very weak one. One had to be blind not to see the bubble in the US housing market or the internet bubble. And this is the case for most asset bubbles in history. When asset prices increase at a rate of 20% or more per year, and when credit aggregates increase by similar percentages in a sustained way during several years, one can be pretty sure that a bubble is on the move, and that a crash is imminent.

It has been argued that even if central banks can detect bubbles, they are pretty much powerless to stop them. This argument is not very convincing. It is not inherently more difficult to stop asset bubbles than it is to stop inflation. And central banks have been very successful at stopping inflation.

This is not an argument to target asset prices. Few economists today would make that argument. What is possible, however, is a leaning against the wind approach, whereby the emergence of a bubble leads the central bank to tighten

policy more than it would do otherwise. This was in fact proposed by the ECB in its Monthly Bulletin of April 2005.

Second, central banks should be involved in the supervision and regulation of all institutions that create credit and liquidity. The UK approach of dissociating monetary policy from banking supervision has not worked. Central banks are the only insurers against liquidity risks. Therefore they are the ones who should control those who create credit and liquidity. Failure to do so will continue to induce agents to create excessive amounts of liquidity, endangering the financial system.

The fashionable inflation-targeting view is a minimalist view of the responsibilities of a central bank. The central bank cannot avoid taking more responsibilities beyond inflation targeting. These responsibilities include the prevention of bubbles and the supervision of all institutions that are in the business of creating credit and liquidity.

Can monetary policy really be used to stabilize asset prices?

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Many observers have argued that central banks should use monetary policy to prevent the rise of asset price bubbles. Recent research shows that monetary policy is too costly and too slow to serve such a role.

The subprime crisis and falling property prices in the United States and elsewhere have put central banks back in the firing line.¹ Many commentators are noting that asset price booms, in particular those affecting residential property prices, have triggered many previous episodes of financial instability (Ahearne et al., 2005; Goodhart and Hofmann, 2007). Thus, the argument goes, the most recent developments provide additional evidence that central banks should react proactively to asset prices movements, and do so over and beyond what these imply for aggregate demand and inflation (Borio and Lowe, 2002; Cecchetti et al., 2000).

Of course, conducting monetary policy in this way is not easy. In addition to the fact that the central bank must form a view of whether a particular asset price increase is dangerous or not, it requires monetary policy to have predictable effects on asset prices. Furthermore, the size of interest-rate movements required to prevent a bubble from developing must not be so large as to cause output and inflation to fall substantially below the central bank's objectives for them (Bean, 2004; Bernanke, 2002; Kohn, 2006). Finally, the effects of monetary policy on different asset prices must occur at about the same speed, since otherwise policy-makers will have to choose between which precise asset prices they wish to stabilize.

While these issues are all eminently empirical, somewhat surprisingly they do not appear to have a prominent role in policy discussions of this issue. In a forthcoming CEPR discussion paper, we seek to address them by studying the responses of real residential property prices and real equity prices, the price level and the level of real GDP to monetary policy shocks, using a panel of 17 OECD countries – Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States – over the period 1986–2006. In our paper we disregard differences across countries and focus instead on the average responses of the economies to an unexpected tightening of monetary policy.²

1 The views expressed are our own and are not necessarily shared by the Swiss National Bank.

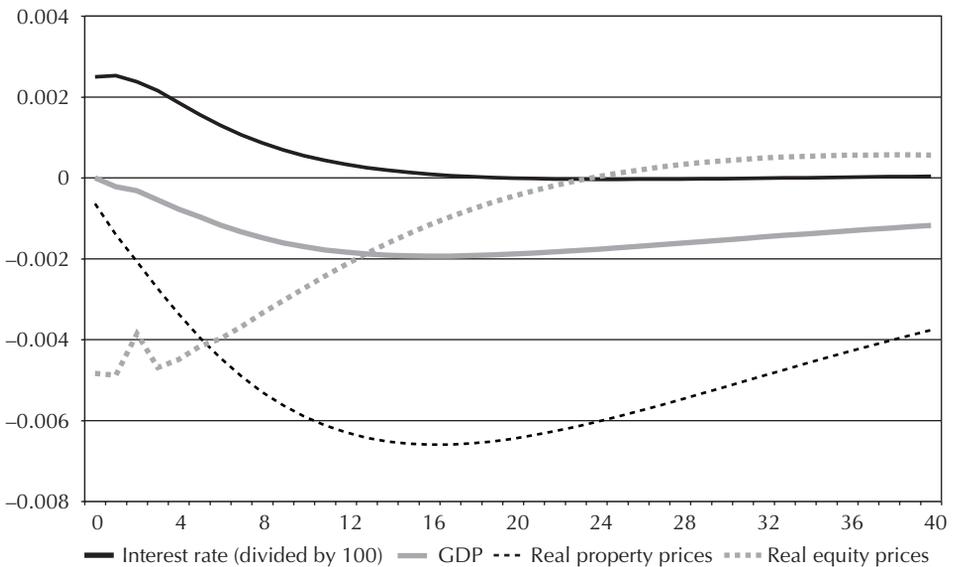
2 Technically, we discuss the results from estimates of a panel VAR. The working paper contains information about the choice of data and the estimation approach.

Responses to monetary policy

Of course, it is important to be clear about what we mean by such a monetary policy shock. There is much agreement that in setting interest rates, central banks react to current inflation and the current state of the business cycle. By contrast, and barring exceptional circumstances, monetary policy responds to asset prices only over time if they are seen to diverge from the levels with which the central bank feels comfortable. We therefore view contemporaneous co-movements between interest rates and the price level, and interest rates and real GDP, as reflecting reactions by the central bank to these variables, and contemporaneous co-movements in interest rates and asset prices, as reflecting market reactions to monetary policy news.

Figure 1 analyses the effects of a 100 basis points' increase in interest rates. Note that after about eight quarters interest rates have declined but remain about 35 basis points above their initial level. After 12 quarters, they have fallen further to a level some 10 basis points above the starting point. Overall, the increase in interest rates will dissipate in about three years.

Figure 1 Responses to a monetary policy shock



Turning to real property prices, we note that these start to fall in response to the tightening of monetary policy. After 16 quarters, they reach a bottom of about 2.6% below the initial level and then start to return gradually to their starting level. Overall, property prices react quite slowly to monetary policy actions.

Next we consider the responses of real GDP.³ The figure shows that it also reaches a trough after 16 quarters, when it is some 0.8% below its initial level.⁴ Thus, the responses of real GDP are almost exactly one-third of those of real property prices.⁵ This is an important finding. To see why, suppose that monetary policy-

makers come to believe that a real property price bubble of 15% has developed, and decide to tighten monetary policy in order to bring down asset prices. In doing so, the average central bank in the 17 countries we study should also expect to depress the level of real GDP by 5%, a truly massive amount.

Finally, we consider the responses of real equity prices. Interestingly, these fall by about 2% – or almost as much as real property prices – but do so immediately. After 16 quarters, when real property prices reach their trough, real equity prices are less than 0.5% below their initial level. The finding that property and equity prices react at very different speeds is important since it implies that central banks cannot stabilize both. This is yet another reason why we believe that the idea of using interest-rate policy to forestall asset prices bubbles is not practicable.

Conclusions

Whatever merits such a stabilization policy has in theory, our research suggests that in practice monetary policy is too blunt an instrument to be used to target asset prices. The effects on real property prices are too small, given the responses of real GDP, and they are too slow, given the responses of real equity prices. In particular, there is a risk that setting monetary policy in response to asset price movements will lead to large output losses that exceed by a wide margin those that would arise from a possible bubble burst.

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4 The responses of output are somewhat more persistent than those typically found in the literature but comparable to those obtained when estimating individual country VARs on the same data set. The higher persistence is likely due to the fact that panel estimates are less susceptible to idiosyncratic noise in the data.

5 We emphasize that the finding that real GDP responds one-third as much as real property prices does not depend on the exact assumptions we made about monetary policy when constructing the graph.

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A missed opportunity for the Fed

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The Fed's move on 17 August 2007 was a missed opportunity. It should have effectively created a market by expanding the set of eligible collateral, charging an appropriate 'haircut' or penalty interest rate, and expanding the set of eligible borrowers at the discount window to include any financial entity that was willing to accept appropriate prudential supervision and regulation.

In response to the credit and liquidity crunch that has recently spooked global financial markets the Federal Reserve reduced, on Friday 17 August 2007, its primary discount rate from 6.25% to 5.75%. The discount rate is the rate that the Fed charges eligible financial institutions for borrowing from the Fed against what the Fed deems to be eligible collateral. It is normally 100 bps above the target federal funds rate, which is the Fed's primary monetary policy instrument and which is currently 5.25%. We believe that this cut in the discount rate was an inappropriate response to the financial turmoil.

The market failure that prompted this response was not that financial institutions are unable to pay 6.25% at the discount window and survive (given that they have eligible collateral). The problem is that banks and other financial institutions are holding a lot of assets which are suddenly illiquid and cannot be sold at any price. That is, there is no longer a market that matches willing buyers and sellers at a price reflecting economic fundamentals. Lowering the discount rate does not solve this problem; it just provides a 50 bps subsidy to any institution able and willing to borrow at the discount window.

What the Fed should have done

Instead of lowering the price at which financial institutions can borrow, provided they have suitable collateral, the Fed should have effectively created a market by expanding the set of eligible collateral and charging an appropriate 'haircut' or penalty. Specifically, it should have included financial instruments for which there is no readily available market price to act as a benchmark for the valuation of the instrument for purposes of collateral.

There is no apparent legal impediment to doing this.¹ Allowable collateral includes a wide range of government and private securities, including mortgages and mortgage-backed securities. Indeed, the Federal Reserve Act of 1913 allows the Federal Reserve to lend, in a crisis, to just about any institution, organization or individual, and against just about any collateral the Fed deems fit. Specifically, if the board of governors of the Federal Reserve system determines that there are ‘unusual and exigent circumstances’ and at least five out of seven governors vote to authorize lending under Section 13(3) of the Federal Reserve Act, the Federal Reserve can discount for individuals, partnerships and corporations (IPCs) ‘notes, drafts and bills of exchange ... indorsed or otherwise secured to the satisfaction of the Federal Reserve bank’. The combination of the restriction of ‘unusual and exigent circumstances’ and the further restriction that the Federal Reserve can discount only to IPCs ‘unable to secure adequate credit accommodations from other banking institutions’, fits the description of a credit crunch/liquidity crisis like a glove.

How to avoid planting the seeds of the next crisis

It is of course essential that moral hazard be minimized. This bailout of the illiquid by the Fed should be sufficiently costly that those paying the price will still remember it during the next credit boom, and act more prudently. Second, where no market price is available, the Fed should base its valuation on conservative assumptions about the creditworthiness of the counterparty and the collateral offered by the counterparty. The counterparty should not expect to get 90 cents on the dollar for securities that it could not find a willing private taker for at any price. Third, the highest ‘liquidity haircut’ in the Fed’s arsenal should be applied to this conservative valuation.

The Fed should also enlarge the set of eligible counterparties at the discount windows. This should not just be banks and other depository institutions, but any financial entity that is willing to accept appropriate prudential supervision and regulation. The nature of the supervision and regulation required will differ depending on the nature of the institution. Hedge funds or private-equity funds need different prudential regulation from depository institutions, investment banks and pension funds. At the very minimum, however, transparency grounded in comprehensive reporting obligations should be required of any institution eligible to use the discount window.

The wisdom of leaving the monetary policy rate untouched

At least the Fed did not cut the monetary policy rate (the federal funds target which remains at 5.25%). A cut in the federal funds target is warranted only if the

1 See our 13 August 2007 Vox column for details. Also see David H. Small and James A. Clouse (2004), ‘The Scope of Monetary Policy Actions Authorized under the Federal Reserve Act’, Board of Governors of the Federal Reserve System Research Paper Series - FEDS Papers 20004-40 (July), at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=622342.

2 One definition of moral hazard is at <http://www.thefreedictionary.com/moral+hazard>.

Fed were to believe that the recent financial market kerfuffles are likely to have a material negative effect on real activity in the United States or on the rate of inflation. There is no evidence as yet to support such a view. If and when it happens, the Fed should act promptly. But addressing the problem of illiquid financial markets using the blunt instrument of monetary policy, a cut in the monetary policy rate, would be clear confirmation that the Fed is concerned about financial markets over and above what these markets imply for the real economy. Such regulatory capture would effectively redirect the 'Greenspan put' from the equity markets in general to the profits and viability of a small number of financial institutions. It would not be a proper use of public money.

The central bank as the market-maker of last resort: from lender of last resort to market-maker of last resort

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Last week's actions by the ECB, the Fed and the Bank of Japan were not particularly helpful. It was a classic example of trying to manage a credit crisis or liquidity squeeze using the tools suited to monetary policy-making in orderly markets. Monetary policy is easy; preventing or overcoming a financial crisis is hard; managing the exit from a credit squeeze without laying the foundations for the next credit and liquidity explosion is harder still. Central bankers should earn their keep by acting as market-makers of last resort.

When banks were the main providers of credit, the financial stability mandate of central banks could be summarized as their lender-of-last-resort function: in times of crisis, lend freely, at a penalty rate and against collateral that would be good in normal times but may be impaired in times of crisis. The counterparties of the central bank in these lender-of-last-resort operations were commercial banks (shorthand for deposit-taking institutions whose main liabilities were deposits withdrawable on demand and subject to a sequential service (first come, first served) constraint. Their main assets were illiquid loans. This financial structure invited bank runs when confidence in the banks was undermined, for whatever reason. In the days when banks were the dominant intermediaries, a credit crunch or liquidity squeeze manifested itself in the inability of banks to borrow; a lender of last resort that targeted banks was the right vehicle for dealing with liquidity crises and credit squeezes in that set-up.

These days are gone in the globally integrated modern financial systems characterizing all advanced industrial countries and an increasing number of emerging markets.

Today, external finance to non-financial corporations and to financial institutions is increasingly provided not through banks but through the issuance of tradable financial instruments directly to the financial markets or indirectly to the financial markets through banks and other financial institutions whose assets are, thanks to securitization and similar techniques, liquid in normal times. Now that financial markets (and non-bank financial institutions) have increasingly taken over the function of providing credit and all forms of finance to deficit spending units, a credit crunch or liquidity crunch manifests itself in a different way from the world described by Walter Bagehot's lender of last resort (see Walter Bagehot (1873), *Lombard Street: A Description of the Money Market*).

Today, a credit crunch or liquidity squeeze manifests itself as disorderly financial markets. Because of pervasive Knightian uncertainty (risk that is perceived as immeasurable and not possible to calculate or quantify), fear and in the limit, panic, little or no trade occurs in certain classes of financial instruments (say sub-prime mortgage-backed CDOs) because there is no market-maker with both the knowledge to price these financial instruments and the deep pockets to credibly post buying and selling prices. The precise way in which such micro-market failure (the failure to match willing buyers and sellers at prices acceptable to both) occurs differs for exchange-traded instruments and over-the-counter financial instruments (instruments for which bilateral bargaining over a deal is the normal exchange mechanism), but the solution is the same: the central bank has to become the market-maker of last resort. The market-maker of last resort function can be fulfilled in two ways: first, outright purchases and sales of a wide range of private-sector securities; second, acceptance of a wide range of private-sector securities as collateral in repos, and in collateralized loans and advances at the discount window.

Outright purchases and sales of illiquid private-sector securities

The first and most direct way to discharge the market-maker of last resort function is through open-market operations in a much wider range of financial instruments, especially private-sector securities, than central banks normally are willing to trade in. Open-market operations here means outright sales and purchases of financial instruments (i.e. not collateralized loans or advances).

As regards making markets in private-sector securities during times of crisis, central banks appear to have moved in the opposite direction to what the logic of financial system development would suggest. Since 1933, 'the Federal Reserve has gradually narrowed the scope of securities that it purchases (or with which it conducts repurchase agreements in the open market' (David H. Small and James A. Clouse (2004), 'The Scope of Monetary Policy Actions Authorized under the Federal Reserve Act', Board of Governors of the Federal Reserve System Research Paper Series - FEDS Papers 20004-40, July; this is also the source from which the information on the Fed's eligible counterparties and eligible securities is taken; see also the Federal Reserve Act itself). There have been no purchases of state or local government debt since 1933 and of bankers' acceptances since 1977. Repos using bankers' acceptances were discontinued in 1984. Outright purchases of US agency debt ceased in 1981. Effectively, outright purchases and sales in the open market have in recent decades been restricted to gold and foreign exchange, and securities issued or guaranteed by the US federal government and certain US government agencies.

For outright sales and purchases in the open market to be effective instruments with which to address a credit crunch, the Federal Reserve should be able to buy and sell outright a range of private-sector credit instruments. The private instruments explicitly authorized for outright purchase and sale by the Federal Reserve Act are bankers' acceptances and bills of exchange that meet certain real bills criteria, derived from a now defunct, at best irrelevant, and in most of its versions internally inconsistent theory of credit and money. However, while the Federal

Reserve Act contains no language authorizing the Federal Reserve to purchase corporate bonds, bank loans, mortgages, credit-card receivables or equities, it also does not forbid it. After all, the Federal Reserve Act also does not authorize the sale or purchase of options, yet the Fed of New York sold options on overnight repo transactions with exercise dates around the 1999 year-end, to forestall any Y2K problems.

The history of the ECB, which did not start operations until 1 January 1999, is short. Its legislative mandate and operating practices are less encumbered by history than those of the Fed.

The ECB accepts, in principle, a very wide range of both marketable and non-marketable assets both for outright purchase and as collateral in repos or collateralized loans (see European Central Bank (2006), *The Implementation of Monetary Policy in the Euro Area*, September 2006; General Documentation on Eurosystem Monetary Policy Instruments and Procedures). The list of eligible instruments for outright open-market operations (and the criteria for establishing that list) is effectively the same as that for instruments eligible as collateral in repos and discount-window operations.

Among the marketable instruments it accepts are, for instance, many asset-backed securities (ABS) and mortgage-backed securities (MBS). As counterparties, it accepts central banks, public-sector entities, private-sector entities, and international and supranational institutions. The issuer must be established in the European Economic Area (EEA) or in one of the non-EEA G10 countries (including the United States, Canada, Japan and Switzerland).

There are some strange restrictions. For instance, in the case of ABS, the 'cash flow-generating assets backing the asset-backed securities must 'not consist, in whole or in part, actually or potentially, of credit-linked notes or similar claims resulting from the transfer of credit risk by means of credit derivatives.' (ECB, 2006). Why credit risk, or derivatives based on credit risk, would be treated differently from market risk, and derivatives based on market risk, is a deep mystery. Functionally, risk is risk; as long as it can be priced, it is fungible.

There is also the rather wimpish restriction that the debt instrument must be denominated in euro, which means that it cannot be helpful to BNP Paribas in establishing a market for the (presumably dollar-denominated) CDOs backed by pools of US subprime mortgages. Why would the ECB wish to avoid collateral denominated in currencies other than the euro? Exchange rate risk can be hedged. Whether it ought to be hedged, or to what extent, should depend not on the currency composition of the balance sheet of the ECB, but on the contribution of the currency risk of the entire financial system of the eurozone to the optimal risk-return combination of that financial system, of which currency risk and return are but one component. Clearly, the ECB should accept collateral denominated in currencies other than the euro if it takes its systemic stability role seriously.

The minimum credit rating it requires for eligible securities is A (that is, nothing below A-). This could be quite restrictive in a liquidity crunch/credit crisis. But if the three leading ratings agencies could convince themselves (and the markets) that the higher tranches of CDOs secured against a pool of subprime home mortgages could be rated AAA, there might be no lower bound to the creditworthiness of instruments rated A. Even so it would seem desirable to permit central banks, under exceptional and extreme circumstances, to accept as collateral for redis-

counting, loans, advances or repos, financial instruments with any credit rating or unrated (junk) securities, provided they are appropriately priced and have appropriate haircuts applied to them.

Fortunately, the list of eligible counterparties and eligible instruments for the ECB and the European system of central banks (ESCB) is not fixed by law. It is decided by the ECB's governing council and can be changed at the drop of the collective hat. We would argue that the hat has dropped and that, in extremis, the ECB should consider the broadest possible set of counterparties and the most unrestricted possible set of eligible financial instruments.

The practical implementation of the market-maker of last resort function can be done in many different ways. In the simplest case, the central bank could announce that for the next N trading hours or days, it would buy at least X amount of a given type of credit-impaired, illiquid security with a risk-free price P , at a price $P_1 < P$ and/or sell at most Y amount of that security at a price $P_2 > P_1$. The discount relative to the risk-free price and bid-ask spread $P_2 - P_1$ would reflect the central bank's assessment of the risk fundamentals and of the penalty required to avoid moral hazard. Note that both the selling price and the buying price set by the central bank would be set without the benefit of a contemporaneous market price for the security.

Acceptance of illiquid private securities as collateral for repos and at the discount window

The second way for the central bank to act as a market-maker of last resort is to accept illiquid private securities as collateral for repos and at the discount window. This, indirectly, requires the central bank to establish a valuation of these securities. By engaging in both repos and reverse repos for the same illiquid private financial instruments, the central bank could establish the same implicit buying and selling prices P_1 and P_2 as it can through outright purchases and sales of these instruments. In the case of repos, which would, in the simplest case, be at the policy rate of interest set by the central bank, the penalty component of the contract would be determined both by the relationship of P_1 and P_2 to the risk-free price, and by the 'haircuts' (additional liquidity discounts) applied to these valuations by the central bank.

For the ECB, this should be but a small step, because it already accepts non-marketable assets as collateral in repos and collateralized loans, specifically credit claims and non-marketable retail mortgage-backed debt instruments. Extending the scope of assets eligible as collateral to assets that are marketable under normal conditions but have become non-marketable owing to the disorderly markets characteristic of extreme credit crunches and liquidity crises should be simple.

It is clear the Federal Reserve Act permits the Fed, under unusual and exigent circumstances, to lend or repo against any collateral, including dead dogs and illiquid CDOs backed by subprime mortgages.

The lender-of-last-resort function and the discount window

While the market-maker of last resort function is a defining function of the modern central bank, the traditional lender-of-last-resort function can also be relevant

in the resolution of a crisis. Repos are collateralized open market operations; we define the lender-of-last-resort function as bilateral transactions between the central bank and a private counterparty at the discount window. With the diminished importance in the financial system of banks and similar deposit-taking institutions, it is important that the central bank be able to exercise this function also vis-a-vis a wider range of counterparties, and against a richer array of collateral than that traditionally offered by commercial banks.

Eligible counterparties and eligible securities in a crisis

Fortunately, the Federal Reserve Act (1913) allows the Federal Reserve to lend, in a crisis, to just about any institution, organization or individual, and against any collateral the Fed deems fit. Specifically, if the board of governors of the Federal Reserve System determines that there are ‘unusual and exigent circumstances’ and at least five (out of seven) governors vote to authorize lending under Section 13(3) of the Federal Reserve Act, the Federal Reserve can discount for individuals, partnerships and corporations (IPCs) ‘notes, drafts and bills of exchange indorsed or otherwise secured to the satisfaction of the Federal Reserve bank ...’. The combination of the restriction of ‘unusual and exigent circumstances’ and the further restriction that the Federal Reserve can discount only to IPCs ‘unable to secure adequate credit accommodations from other banking institutions’, fits the description of a credit crunch/liquidity crisis like a glove.

It is, of course, key that such (re)discounting be at a penalty rate and against collateral deemed adequate by the central bank. The Fed’s discount window has three different facilities and associated rates. The benchmark primary credit rate currently stands at 6.25%, 1.00% above the federal funds target rate. The secondary and seasonal credit rates exceed the primary rate. The ECB’s marginal lending facility currently charges a 5.00% rate, also 1.00% above the ECB policy rate, the main refinancing operations minimum bid rate, which stands at 4.00%. Financial instruments eligible for collateral in discount operations (or repos) are valued at their market prices and a ‘haircut’ is applied to them.

The combination of the 100 bps extra cost of the discount window over the policy rate and the haircut would be a sufficient incentive not to abuse the discount window if there were a meaningful market price at which the securities offered as collateral could be valued. Of course, in a crisis, such market prices cannot be found. This is where the job of the central bank becomes difficult, politically contentious and of vital importance. In its discount-window operations during crisis times, that is, when acting as lender of last resort to some institution or IPC, the central bank will also often have to act as market-maker of last resort because it will have to value financial instruments for which no meaningful market price is available.

How have central banks managed liquidity crises and credit crunches?

When acting as market-maker of last resort, as when acting as lender of last resort, the central bank inevitably plays a central role in assessing and pricing credit risk;

through this, the central bank will have a profound influence on the allocation of credit in the economy (see Small and Clouse, 2004). While the central bank should not be in this business during ordinary times, when markets are orderly and price formation and price discovery proceed without the direct intervention of the central bank, it cannot avoid being in this business when markets are disorderly and fail to match buyers and sellers of securities.

Central banks have not been doing the job of market-maker of last resort effectively, indeed they have barely been doing it at all. Following the stockmarket collapse of 1987, the Russian default of 1998 and the tech bubble crash of 2001, all that the key monetary authorities have done is lower the short risk-free interest rate and provide vast amounts of liquidity against high-grade collateral only, and nothing against illiquid collateral. The result has been that the resolution of each of these financial crises created massive amounts of high-grade excess liquidity that was not withdrawn when market order was restored and provided the fuel that would produce the next credit boom and bust. By focusing instead on illiquid collateral, it should have been possible to achieve the same effect with a much smaller injection of liquidity.

The incipient financial crunch of mid-2007 has not, thus far, been met with interest-rate cuts by any of the key central banks: the Fed, the ECB, the Bank of Japan and the Bank of England. That is just as well, because there is, as yet, nothing excessive about the level of the (default-) risk-free short nominal interest-rate levels in the United States, the eurozone, Japan or the United Kingdom. A credit crunch is the time for central banks to start worrying about the next credit boom. Lowering the risk-free rate is not the solution to any credit crunch/liquidity crisis problem. It only encourages further borrowing and leverage by those already excessively prone to such acts.

The problems we are seeing today are the result of four or five years of excessively low risk-free interest rates at all maturities in the United States, Euroland and Japan, and ludicrously low credit risk spreads across the board (not just in the subprime mortgage markets).

These two asset market anomalies resulted in many highly leveraged open positions that were predicated on the persistence of low risk-free rates and low spreads. Regulatory and supervisory failures compounded the magnitude of the debt and credit-risk bubble that had been created. The supervisory and regulatory failures in the US mortgage markets (and not just at the subprime end of the spectrum) are so manifest that those on whose watch they occurred ought to be called to account.

When the great normalization finally came (starting with rising risk-free real and nominal long-term rates and rising risk-free nominal short-term rates, and picking up steam with the normalization of credit-risk spreads, starting from the US subprime residential mortgage markets and derivatives based on them), a growing number of these highly leveraged open positions went belly up. At the junk end of the market, realized default rates began to be recorded that exceeded those that had been priced into the primary and derivative securities issued in past years in these markets.

Some funds heavily invested in these mispriced subprime mortgage-based securities went bankrupt. That is as it should be. Others, as in the case of three BNP Paribas funds exposed to the US subprime mortgage market, suspended the abili-

ty of investors to withdraw their investments from the funds, because the funds' managers and their BNP Paribas owners argued they had no way to value the funds' assets, which had become illiquid in the turbulent asset market conditions of the past week.

It is possible, indeed quite likely, that more funds that made highly leveraged bets whose success depended on the continuation of low risk-free rates and low credit spreads will go bankrupt – and not only funds exposed to the US subprime mortgage market; the problem of financial hubris was much more widespread than that. Financial institutions heavily exposed to such funds and insufficiently diversified in other ways may also go bankrupt. Among the ranks of the potential victims could be investment banks and deposit-taking institutions. That again is as it should be, and does not call for intervention. It certainly does not call for lower central-bank policy rates. Charles Darwin must have his pound of flesh also in the financial markets, lest the central banks create a credit-risk put that would put Greenspan's equity puts in the shade.

What is not as it should -be is that fear and panic cause financial markets to dry up, making it impossible for firms that need to raise cash to do so either by selling assets that would have realizable value in orderly markets, or by borrowing using these assets as collateral. Even if the assets are impaired, there should still be a market to sell them at a discount appropriate to the central bank's assessment of its risk of default and of the orderly market price of risk. Collateralized borrowing against such impaired assets should likewise be possible at the same default-risk-appropriate discount (as assessed by the central bank). If the markets for selling impaired assets or for borrowing using impaired assets as collateral seize up and cease to function, the central bank must step in to perform its market-maker of last resort function.

During the past week, the ECB, the Fed and the Bank of Japan have injected well over \$200 billion worth of liquidity into the markets to stop the relevant private benchmarks from rising above their policy-rate targets (in the United States, the federal funds rate was threatening to rise sharply above 5.25%; in Euroland, the overnight interbank rate was threatening to rise above 4.00% and in Japan the overnight rate likewise was threatening somewhat less convincingly to rise above 0.50%). We consider this action not to have been particularly helpful: even where the open-market purchases were collateralized against mortgage bonds, the central banks chose high-grade mortgage bonds for which there still was a private market and price rather than illiquid mortgage bonds for which the market had stalled and no market price was available. This was a classic example of central banks trying to manage a credit crisis or liquidity squeeze using the same tools and routines they use to make monetary policy in orderly markets.

A credit crunch and liquidity squeeze is instead the time for central banks to get their hands dirty and take socially necessary risks which are not part and parcel of the art of central banking during normal times when markets are orderly. Making monetary policy under conditions of orderly markets is really not that hard. Any group of people with IQs in three digits (individually) and familiar with (almost) any intermediate macroeconomics textbook could do the job. Dealing with a liquidity crisis and credit crunch is hard. Inevitably, it exposes the central bank to significant financial and reputational risk. The central banks will be asked to take credit risk (of unknown) magnitude on to their balance sheets and they will have

to make explicit judgements about the creditworthiness of various counterparties. But without taking these risks the central banks will be financially and reputationally safe, but poor servants of the public interest.

So: monetary policy is easy; preventing or overcoming a financial crisis is hard; managing the exit from a credit squeeze without laying firm foundations for the next credit and liquidity explosion is harder still. Our central bankers should earn their keep by acting as market-makers of last resort. Covering the central bank's posterior is less important than preventing avoidable financial instability.

Avoiding disorderly deleveraging

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8 May 2008

The global financial system may be caught in a downward spiral as market and funding illiquidity reinforce each other. The author of CEPR Policy Insight 22 presents a radical proposal that would break the feedback loop by not valuing illiquid assets at market prices under crisis conditions.

Prolonged financial distress, which has now lasted for almost a year, is debilitating the financial system and risking a fully-fledged crisis. Central bank interventions have thus far prevented worst-case outcomes, but they have alleviated symptoms rather than the underlying causes. Financial intermediaries are still in the process of shrinking their balance sheets, thus activating a channel of transmission of financial distress to the real economy.

The recent turmoil is a product of deep flaws in banks' new business model and recent financial innovations. Many proposed reforms may reduce the risk of these events repeating, but most cannot undo the effects of the present crisis and ensure a smooth transition. The immediate problem is a spiral of forced deleveraging and illiquidity, as the link between market and funding illiquidity strains balance sheets. Proposed remedies are either insufficient or unsatisfactory, which means that more radical interventions may be required. In CEPR Policy Insight 22, I propose a bold alternative.

Structural problems and medium-term solutions

The current turmoil can be attributed to a business model in which banks would pool and securitize credits that they originated to distribute them and transfer their risks to a myriad of investors. Though the new model promised benefits in credit allocation, new risk-return investment opportunities and financial stability, it is now known to have suffered from a catalogue of problems. These range from excessive credit due to permissive monetary policies to flaws in ratings agencies' risk models, from perverse incentives guiding the agencies and bank managers to regulatory failures. While mending those fault lines is an important task that will require international cooperation, it will at best take care of the future, not the present.

Forced deleveraging and the liquidity spiral

The immediate problem is the disorderly reaction to the unprecedented growth of the financial system's leverage and its exposure to risk. As demand for asset-backed securities has disappeared, prices have collapsed without finding a floor. Banks are reporting losses that strain their capital positions. The loss of market liquidity affecting all classes of debt securities directly or indirectly owned by intermediaries has translated into a sharp decline of funding liquidity, the more so because short-term debt issued on wholesale markets has become a major component of banks' funding. The forced adjustment of banks' balance sheets could, in the worst case, result in a credit crunch with painful consequences for the real economy.

Can we break the link between the illiquidity of banks' securitized assets, which prevents their orderly liquidation, and the shortage of funding liquidity, which is the driving force of the negative feedback originating from the process of deleveraging?

For funding liquidity, emergency liquidity support from central banks has helped lower the temperature in the worst moments, but it is not a long-term solution. Setting a collateral value of illiquid securities does not provide a market for them and hence does not set a floor to their market prices; the collateralized securities remain on the intermediaries' books, affecting the quality of their balance sheets. Capital increases are also insufficient to break the spiral, as injections of capital may prove inadequate only a few weeks after their announcement.

For market liquidity, suggested remedies are equally inadequate. Mandated full disclosure of losses might reduce uncertainty, but unless market liquidity is instantly restored, full disclosure of the situation at time t offers no guarantee that it will be the same at time $t + 1$. Similarly, retreating from marking financial products to market or model during this time of crisis would face a number of difficulties.

More radical solutions

The feedback between market and funding liquidity problems demands more radical pre-emptive solutions. As long as 'there is no immediate prospect that markets in mortgage-backed securities will operate normally', 'the situation will improve only if the overhang of illiquid assets on the banks' balance sheets is dealt with' (Bank of England, 2008). In creating its special liquidity scheme, the Bank of England has moved to serve as the market-maker of last resort.

The scheme allows banks and building societies to swap some of their illiquid assets, including debt securities rated no less than triple A, for specially issued Treasury bills for up to three years. Eligible securities will be valued at market prices, if available, or, if not, at a price calculated by the Bank, with 'haircuts' for private debt securities. Changes in market prices or in valuations will require re-margining. The credit risk will remain with the banks, so that there will be a loss for the lender only if the borrower defaults and the value of the collateral falls below that of the bills originally acquired in the operation.

Is the initiative bold enough? The scheme does not set a floor for assets' market prices and uses market prices to value collateral, despite the fact that during a

negative bubble they do not reflect fundamentals. Downward instability may, moreover, occur if 'haircut' discounted collateral values trigger a convergence process for market prices requiring repeated re-margining.

In CEPR Policy Insight 22, I recommend the creation of a publicly sponsored entity that could issue guaranteed bonds to banks in exchange for illiquid assets, drawing on the US Treasury Secretary Nicholas Brady's solution to the Latin American sovereign debt crisis in 1989. This new entity, preferably multilateral, would value assets based on discounted cashflows and default probabilities rather than crisis-condition market prices.

As a firm floor is set to valuation and illiquid assets otherwise running to waste are replaced by eminently liquid Brady-style bonds, funding difficulties and, at the same time, the market liquidity problems besetting the banks' balance sheets would be removed. Shielding the banks' assets from the vagaries of disorderly markets is a necessary condition to dispel the uncertainty that prevents a proper working of credit markets.

Reference

Bank of England (2008), 'Special Liquidity Scheme', Information, Market Notice, 21 April.

Chronology

28 December 2006

Ownit Mortgage Solutions files for bankruptcy.

7 February 2007

US Senate Banking Committee holds hearing on predatory lending in subprime sector.

22 February 2007

HSBC losses top \$10.5 billion. Head of HSBC US mortgage-lending business is fired.

7 March 2007

The Federal Deposit Insurance Corporation issues a cease-and-desist order against subprime lender Fremont Investment & Loan, which had been 'operating without adequate subprime mortgage loan underwriting criteria'.

8 March 2007

Donald Tomnitz, the CEO of D. R. Horton, the largest US homebuilder, tells investors, 'I don't want to be too sophisticated here, but '07 is going to suck, all 12 months of the calendar year.'

12 March 2007

Lenders to New Century Financial, a large subprime lender, cut off its credit lines. Trading in its shares is suspended by the New York Stock Exchange.

16 March 2007

Subprime lender Accredited Home Lenders to sell, at a heavy discount, \$2.7 billion of loans. The New York Attorney General announces an investigation of subprime lending.

2 April 2007

New Century Financial files for bankruptcy.

24 April 2007

The National Association of Realtors announces that existing home sales fall 8.4% during March, the greatest drop in 18 years.

3 May 2007

GMAC, the finance arm of General Motors, reports losses of \$1 billion. UBS closes its US subprime business. First comprehensive plan to help homeowners avoid foreclosures presented in US Senate.

6 June 2007

The Bank of England reduces the overnight bank rate by 25 basis points to 5.5%.

22 June 2007

Bear Stearns injects \$3.2 billion into two of its hedge funds hurt by falling CDO prices.

4 July 2007

UK authorities take action against five brokers selling subprime mortgages.

10 July 2007

All three major credit-ratings agencies announce review of subprime bonds.

13 July 2007

General Electric to sell WMC Mortgage, its subprime lending business.

18 July 2007

US housing starts down 20% from the previous year.

31 July 2007

The two Bear Stearns hedge funds that were under stress file for bankruptcy protection.

6 August 2007

American Home Mortgage, one of the largest US home-loan providers, files for bankruptcy.

9 August 2007

BNP Paribas suspends three investment funds hit by subprime crisis. An insurance company, AIG, warns that mortgage defaults are spreading beyond subprime sector.

10 August 2007

The ECB provides €61 billion of funds for banks. The Fed said it would provide as much overnight money. The interest rate on 15-day AAA asset-backed commercial paper hits 6.14% for a historic high.

13 August 2007

Goldman Sachs to pump \$3 billion to rescue a hedge fund. The ECB and central banks in the United States and Japan continue supplying liquidity to markets.

16 August 2007

Countrywide draws down its \$11.5 billion credit line.

17 August 2007

The Federal Reserve cuts the discount rate to 5.75%.

23 August 2007

Bank of America purchases 16% of Countrywide Financial for \$2 billion. Four large US banks announce coordinated borrowing of \$2 billion from the Federal Reserve's discount window.

28 August 2007

German bank Sachsen Landesbank is sold to Landesbank Baden-Wuerttemberg. The S&P/Case-Shiller Home Price Index for second quarter 2007 is down 3.2% from a year earlier, the greatest drop in the 17-year history of the index.

31 August 2007

Subprime lender Ameriquest files for bankruptcy.

1–3 September 2007

The Federal Reserve's annual Jackson Hole conference focuses on the link between housing and monetary policy.

3 September 2007

IKB, a German regional lender, records \$1 billion loss due to US subprime market exposure.

4 September 2007

Bank of China reveals \$9 billion in subprime losses.

6 September 2007

The delinquency rate on 1–4 family mortgages reaches 5.1% in the US, according to the Mortgage Bankers Association.

13 September 2007

Global Alpha, a hedge fund managed by Goldman Sachs, reveals that it lost 22% during August.

14 September 2007

A run on the deposits of British mortgage lender Northern Rock begins.

18 September 2007

The Federal Reserve cuts the discount rate by 50 basis points to 4.75%. This is the first cut since 2003.

1 October 2007

UBS and Citigroup announce losses of \$3.4 billion and \$3.1 billion respectively.

9 October 2007

The Dow Jones Industrial Average closes at 14,164, its all-time high.

10 October 2007

The US government teams up with mortgage servicers and investors to launch the HOPE NOW alliance, to encourage the voluntary modification of adjustable-rate mortgages to fixed-rate.

14 October 2007

Citigroup, JPMorgan Chase and Bank of America, with the support of the Treasury Department, announce a plan to form a Master-Liquidity Enhancement Conduit (M-LEC) that would purchase asset-backed commercial paper from liquidation SIVs.

15 October 2007

Citigroup and the Japanese bank Nomura announce subprime losses of \$5.9 billion and \$621 million, respectively.

16 October 2007

The National Association of Home Builders confidence index hits 19, the lowest since the series began in 1985.

26 October 2007

Countrywide Financial reports a loss of \$1.2 billion for third-quarter 2007. This is its first loss in 25 years.

30 October 2007

Merrill Lynch announces losses of \$7.9 billion and the resignation of the CEO, Stan O'Neal.

31 October 2007

The Federal Reserve cuts the federal funds rate by 25 basis points to 4.5%. Deutsche Bank reveals a \$2.2 billion loss.

1 November 2007

Credit Suisse discloses a \$1 billion loss. Fed injects \$41 billion.

5 November 2007

Citigroup announces that its \$55 billion portfolio of subprime-related investments has declined in value between \$8 billion and \$11 billion. The CEO, Charles Prince, resigns.

8 November 2007

Morgan Stanley and BNP Paribas disclose mortgage losses of \$3.7 billion and €197 million, respectively. AIG writes down \$2 billion of mortgage investments.

9 November 2007

Wachovia announces \$1.7 billion loss.

13 November 2007

Bank of America announces \$3 billion subprime loss.

14 November 2007

Japan's second largest banking group, Mizuho, reports full-year operating profit fell 13%. HSBC reports losses of \$3.4 billion.

15 November 2007

Barclays reveals \$2.7 billion loss. The US House of Representatives passes the Predatory Lending and Mortgage Protection Act.

16 November 2007

Goldman Sachs forecasts financial losses due to subprime crises at \$400 billion.

19 November 2007

The reinsurance company, Swiss Re, to lose \$1 billion on insurance of clients hit by subprime crises.

20 November 2007

Freddie Mac reports a \$2 billion loss.

27 November 2007

Freddie Mac and Citigroup raise \$6 billion and \$7.5 billion of capital respectively. US house prices record biggest quarterly drop in 21 years.

5 December 2007

The New York Attorney General sends subpoenas to major investment banks to investigate subprime mortgage securitization.

6 December 2007

Royal Bank of Scotland to write off £1.25 billion due to subprime crisis. The Bank of England cuts UK interest rates.

10 December 2007

UBS and Lloyds TSB report \$10 billion and £200m losses due to bad debts in the US housing market.

11 December 2007

The Federal Reserve lowers the federal funds rate by 25 basis points to 4.25%. Washington Mutual subprime losses to reach \$1.6 billion.

12 December 2007

The Federal Reserve announces the creation of the term auction facility (TAF), which will auction a fixed amount of funds to the banking system, initially set at \$20 billion. The Federal Reserve, the ECB and the Swiss National Bank (SNB) also announce that they will engage in currency swaps of up to \$20 billion to the ECB and \$4 billion to the SNB. The Bank of England and Bank of Canada also announce that they will increase their liquidity facilities.

14 December 2007

Citigroup takes \$49 billion worth of SIV assets back on its balance sheet.

17 December 2007

Federal Reserve makes \$20 billion available to commercial banks.

18 December 2007

The Federal Reserve Bank tightens rules on subprime lending. The ECB lends European commercial banks \$500 billion. The Bank of England makes £10 billion available to UK banks.

19 December 2007

As subprime losses reach \$9.4 billion, Morgan Stanley sells 9.9% stake in the company.

21 December 2007

The spread of 15-day AAA asset-backed commercial paper over equivalent duration AAA non-financial commercial paper hits 173 basis points as banks scramble for funding through the end of the year. The spread is usually less than 10 basis points.

22 December 2007

The M-LEC plan to rescue struggling SIVs is abandoned by the sponsoring banks.

4 January 2008

US job losses in residential construction and mortgage lending for the year 2007 estimated at 35,000.

9 January 2008

Bear Stearns reveals subprime losses of \$1.9 billion. The CEO, James Cayne, steps down. The World Bank says that world economic growth will slow in 2008 due to subprime crisis credit crunch.

11 January 2008

Bank of America buys Countrywide for \$4 billion after its shares plunge 48%. Merrill Lynch doubles projection of subprime losses to \$15 billion.

15 January 2008

Citigroup reports a \$9.8 billion loss for the fourth quarter, including \$18 billion loss in mortgage portfolio.

17 January 2008

Lehman Brothers retires from wholesale mortgage lending and will cut 1,300 jobs.

19 January 2008

Fitch Ratings lowers the rating of Ambac, the second-largest monoline insurer after MBIA, from AAA to AA. This is the first downgrade of a large monoline.

22 January 2008

In a surprise move between regularly scheduled meetings, the Federal Reserve cuts the federal funds rate by 75 basis points to 3.50%.

24 January 2008

The French bank Société Générale announces that it lost €4.9 billion due to the unauthorized activity of one of its traders. While the bank closed out the trades during a holiday weekend in the United States, stockmarkets plunged round the world.

30 January 2008

The Federal Reserve cuts the federal funds rate by 50 basis points to 3.00%. Regularly scheduled auctions for municipal debt of the state of Nevada and Georgetown University fail due to lack of bidders and uncertainty about monoline insurers. The debt issuers are forced to pay a penalty rate.

13 February 2008

President Bush signs the Economic Stimulus Act of 2008. The Act provides approximately \$100 billion of tax rebates to be distributed during summer 2008 and \$50 billion of investment incentives.

14 February 2008

UBS announces fourth-quarter 2007 loss of CHF12.4 billion (\$12 billion).

15 February 2008

Problems in the auction-rate securities market continue to spread; over 1,000 auctions fail this week. Investment banks do not allow investors to withdraw funds invested in those securities.

28 February 2008

AIG announces fourth-quarter 2007 losses of \$5.3 billion due to more than \$11 billion of losses on its credit-default swap portfolio.

6 March 2008

The delinquency rate on family mortgages was 5.82% during the fourth quarter of 2007, up 87 basis points from a year earlier, according to MBA's National Delinquency Survey.

11 March 2008

The Federal Reserve Bank of New York announces the creation of the term securities lending facility (TSLF), which lets primary dealers swap AAA-rated securities for Treasury securities. The Federal Reserve, the ECB and SNB increase the size of their dollar swap lines to \$30 billion and \$6 billion respectively.

14 March 2008

The investment firm, Carlyle Capital, defaults on \$17 billion of debt. The fund is leveraged more than 30:1 and invests mostly in agency-backed residential mortgage-backed securities (RMBS).

16 March 2008

The Federal Reserve Bank of New York announces the creation of the primary dealer credit facility (PDCF), which essentially opens the discount window to primary dealers, including non-depository institutions.

17 March 2008

The investment bank Bear Stearns is acquired by JPMorgan Chase for \$2 per share. Bear Stearns stock had been trading at \$60 the previous week before a run pushed it to near insolvency. The Federal Reserve Bank of New York agrees to guarantee \$30 billion of Bear Stearns assets, mostly mortgage-related.

18 March 2008

The Federal Reserve cuts the federal funds rate by 75 basis points to 2.25%.

24 March 2008

JPMorgan Chase raises its bid for Bear Stearns to \$10 per share and agrees to indemnify the Federal Reserve Bank of New York against the first \$1 billion of losses on the \$30 billion that it guaranteed.

8 April 2008

Washington Mutual, one of the largest US mortgage originators, raises \$7 billion from TPG, a private equity firm. The IMF's Global Financial Stability estimates that the total credit losses will be \$1 trillion.

15 April 2008

Alpha magazine reports that hedge-fund owner John Paulson was the highest-paid trader in 2007. His fund, Paulson & Co., rose more than \$20 billion in value during the year by shorting the mortgage market.

18 April 2008

Citigroup announces another \$12 billion of losses related to subprime mortgages, leveraged loans, exposure to monoline insurers, auction-rate securities and consumer credit.

21 April 2008

National City Corporation, a large regional US bank, announces a \$7 billion capital infusion from Corsair Capital, a private-equity firm.

22 April 2008

Royal Bank of Scotland announces that it will raise about £16 billion from investors by selling assets.

30 April 2008

The Federal Reserve lowers the federal funds rate by 25 basis points to 2.0%.

6 May 2008

UBS AG announces CHF11.5 billion (\$11.1 billion) loss during first-quarter 2008.

12 May 2008

Monoline insurer MBIA announces a \$2.4 billion loss during first-quarter 2008.

Glossary

ABX.HE Index: an index produced by Markit that tracks prices on credit-default swaps on tranches of selected asset-backed securities composed of residential mortgages.

Alternative-A (or Alt-A): a category of mortgage borrower, generally with FICO (see below) scores that qualify them for prime rates but that are not eligible for prime for other reasons, such as lack of income documentation.

Asset-backed security (ABS): a security collateralized by financial assets, such as mortgages.

Asset-backed commercial paper (ABCP): see Commercial paper.

Auction-rate security: a municipal bond whose interest rate is set at specified intervals, often two weeks, at auction. In early 2008 a large number of auctions failed due to lack of bidders, causing the municipalities to pay high penalty rates.

Basel II: a revision to the international rules governing bank capital allocation. Coordinated by the Bank for International Settlements. It was designed to lessen the amount of regulatory arbitrage that occurred under its predecessor, Basel I. European banks were supposed to implement Basel II rules by 2008, while US banks implementation may occur in 2009.

Commercial paper (CP): bonds with maturity of less than 270 days. CP can be issued by corporations, banks or trusts holding securities. The last is usually referred to as asset-backed commercial paper (ABCP). ABCP was one of the first casualties of the crisis, starting to decline rapidly in August 2007 as the SIVs unwound.

Collateralized debt obligation (CDO): a structured finance product composed of debt instruments such as corporate and consumer loans, mortgages and bonds. The cash flows from the underlying debt are paid out to the tranches of the CDO according to their seniority. CDO issuance averaged \$500 billion in 2006 and 2007.

Conduit: a financial entity whose purpose is to buy financial assets from correspondents, repackage them and sell interests in the new securities to other entities.

Credit-default swap (CDS): a type of insurance against a firm defaulting on its debt. According to the Bank for International Settlements, the notional amount of CDS outstanding was \$43 trillion as of June 2007.

Discount window: the mechanism through which the Federal Reserve lends directly to banks, thrifts and other chartered depository institutions. The PDCF essentially extended the discount window to primary dealers.

Fannie Mae/Freddie Mac: US government-sponsored enterprises (GSEs) that enhance the flow of credit to the mortgage market. The GSEs purchase mortgages from banks and thrifts and either keep the mortgages or package them into RMBS (see below) and sell them to the secondary market.

FICO score: a numerical rating of the credit history of individuals, developed by the Fair Isaac Corporation.

LIBOR: London interbank offered rate, the interest rate that banks charge each other to borrow money. Denominated in various currencies. US dollar LIBOR is usually tied closely to the federal funds rate but diverged beginning in August 2007 due to a combination of credit and liquidity risk.

Monoline insurer: An insurance company that specializes in insuring the performance of financial instruments, usually mortgage-related. Most offer private mortgage insurance, which is used to insure payments on mortgages with high loan-to-value ratios. Many also insure AAA-rated portions of CDOs.

Mortgage-backed security (MBS): a security that is composed of mortgages. Often separated into MBS backed by residential mortgages (RMBS) and commercial mortgages (CMBS). Fannie Mae and Freddie Mac dominated MBS issuance in the United States until 2004 when private-label MBS, often of subprime mortgages, became more prevalent. Payments of interest and principal on the underlying mortgages can be paid pro-rata (pass-through MBS) or in a 'waterfall' fashion, with 'tranches' getting paid in order of seniority.

Primary dealer credit facility (PDCF): A new policy introduced by the Federal Reserve that essentially opens the discount window to primary dealers. Normally only banks and other depository institutions have access to the discount window. The PDCF was introduced by the Federal Reserve the same weekend that Bear Stearns was acquired by JPMorgan Chase.

Residential mortgage-backed security (RMBS): see Mortgage-backed security.

Securitization: the practice of bundling securities into new securities. Used by financial institutions as a way of moving assets off their balance sheets in order to lend more. Mortgages are most commonly securitized but other debt instruments can also be included. In the United States, Fannie Mae and Freddie Mac actively promote mortgage securitization.

Structured investment vehicle (SIV): a fund that holds long-term securities (such as mortgages) and funds its investments with commercial paper.

Subprime: borrowers whose poor credit history does not qualify them for prime interest rates. In the United States, about 20% of mortgage originations totalling over \$1 trillion in 2005 and 2006 were subprime, far above historical levels.

Term auction facility (TAF): an auction held by the Federal Reserve for a set quantity of money. The TAF was introduced in December 2007 in response to pressures for short-term lending in the money markets.

Term securities lending facility (TSLF): The TSLF is an arrangement by the Federal Reserve to lend to Treasuries and accept other AAA-rated financial instruments as collateral.

Tranche: a method of apportioning cashflows in a structured finance product, such as an asset-backed security. Senior tranches are paid principal and interest first, and junior tranches are paid with whatever cash is left. Senior tranches have more security and consequently earn lower interest rates than junior tranches. Several tranches may be rated AAA. The most senior of the AAA tranches is often called 'super-senior'.

The global financial crisis is often defined by the collapse of the investment bank Lehman Brothers in September 2008. This book, first published as an eBook three months prior to the collapse, recognises that a global crisis was already well underway.

It highlights how losses in the US subprime market had spread beyond the confines of the US mortgage sector and the borders of the United States, how risk spreads had ballooned and liquidity in some markets had dried up forcing large financial institutions to report significant losses. Bank runs were no longer the stuff of history.

The financial crisis that emerged and the policy responses have been unprecedented in scale. They have also challenged economists to explain where the global crisis came from, where it was heading, and what could be done. This book brings together the views and predictions of leading economists published on VoxEU.org months before the developments of late 2008 in a volume that holds its own against the events that followed.

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